

PROCESS OF TQM IMPLEMENTATION : A CASE STUDY OF INDAL-HIRAKUD

**A Thesis Submitted
In Partial Fulfilment of the Requirements
for the Degree of**

MASTER OF TECHNOLOGY

BY

SUNIL PATHAK

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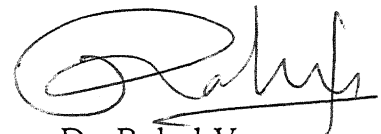
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MARCH, 1997

CERTIFICATE

It is to certify that the work contained in the thesis entitled "**PROCESS OF TQM IMPLEMENTATION: A CASE STUDY OF INDAL-HIRAKUD**" by Mr. Sunil Pathak has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

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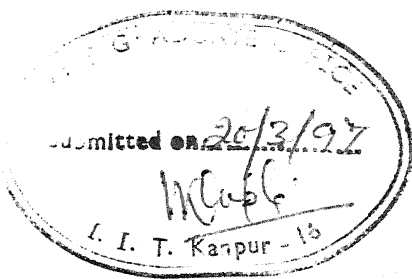
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ABSTRACT

Total Quality Management(TQM) is an enhancement to traditional ways of doing business. It is a proven technique to guarantee survival in the world class competition. At the time when macro economic reforms are changing the competitive environment, the Indian companies are facing stiff competition from global giants, and therefore many of them are adapting TQM to guarantee success.

But bringing TQM into an organization is a long term, complex process of cultural transformation that requires unprecedented competence. Therefore, the present study aims at studying the TQM implementation process in an Indian organization. The research objective is aimed at studying the organizational changes necessary for TQM implementation. A case study approach has been employed in this research to understand the research objective. The case study is done in an Aluminium plant at Hirakud in Orissa.

The study of different organisational issues described in the research framework were able to answer the research questions and give the insight on the TQM implementation process.

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ABBREVIATIONS

BALCO	Bharat Aluminium Company
BGC	Becoming Globally Competitive
BT	Business Today
CAGR	Compounded Annual Growth Rate
CAPEX	Capital Expenditure
CII	Confederation of Indian Industries
D&P	Development and Planning
DSC	Departmental Steering Committee
EOH&S	Environment, Operational, Health, and Safety
EPM	Engineering Production Meeting
GM	General Manager
HINDALCO	Hindustan Aluminium Company
HK	House Keeping
HOD	Head of Department
INDAL	Indian Aluminium Company
IPO	Improve the Process
ISO	International Standards Organization
Kwh	Kilo watt hours
LME	London Metal Exchange
NALCO	National Aluminium Company
PAT	Profit After Tax
PBT	Profit Before Tax
PCB	Printed Circuit Board
QC	Quality Circle
R&D	Research and Development
RI	Rolling Ingots
SGA	Small Group Activities
SH	Shop Council
SPC	Statistical Process Control
SQC	Statistical Quality Control

tpa	Tonnes per Annum
TQM	Total Quality Management
WCI	What Could Be Improved
WM	Works Manager
WSC	Works Steering Committee
WWW	What Went Wrong

INTRODUCTION

1.1 Significance of Total Quality Management

Man has striven for quality since the dawn of history. Early societies were dependent on the quality of food and environment. In response to these needs, strategies for quality emerged- sensing, and judging quality by sight, smell, or feel. Later the industrial revolution created the factory system. Machines performed the roles of human beings. Quality was managed by the skills of workers, supplemented by departmental inspection, testing, measurement, and standardization. Central to the Taylor's system was the separation of planning from the execution. Late in the 19th century, the western companies adapted Taylor's system of scientific management. Though this helped in increasing the productivity, it had a negative impact on quality. To compensate, managers set up central inspection departments. Still the priority given to quality declined and the leadership of quality function became vague. The result was that in the '50s and '60s these world class companies faced stiff competition from the lesser known and economically decimated Japanese counterparts after World War II. Prior to World War II, the export of poor quality goods had earned Japan a natural reputation for shoddy products. To change their image, the Japanese industries devised unprecedented strategies for creating a quality revolution through the preaching of Deming, Juran and Crosby. They devised their own school of thought on quality management known as the Japanese Total Quality Control(TQC). It is empirically based on the experiences of what works in Japanese companies. Also it has highly developed administrative systems that include education, training, self improvement, daily management, group activities, and policy management, etc. After facing stiff competition from the Japanese industries, western companies turned back to the quality principles given by Deming. Deming preached them his "System of Profound

Knowledge" as guidelines for quality practices in the organization which gave birth to Total Quality Management (TQM) in modern form.

TQM is an opportunity to improve the effectiveness and flexibility of the business as a whole. It is essentially a way of organizing and involving the whole organization; every department; every activity; and every single person at every level. TQM is a method for ridding people's lives of wasted efforts by involving everyone in the process of improvement; improving the effectiveness of work so that results are achieved in less time.

In essence, TQM is taking quality out of shopfloor to encompass every activity in an organization, with the customers at the center of all thoughts, process, and decisions. In the words of Joseph M Juran [Shearer, 1996]- *All it means is really a collection of all things we must do to have quality leadership.*

1.2 Significance of TQM For Indian Industry

Comfortably established for decades in the warm cocoon of poor products and shoddy services, corporate India is about to receive the final punishment. Post liberalization, global quality is evolving in the country, hurtling in through goods designed, manufactured, and sold using state of the art quality practices. India is defenseless against the tidal onslaught of total quality.

The world thinks so too. Rated on global scales of quality, India's performance has been abysmal. Among the 41 countries whose products and services are rated by the World Competitiveness Report 1994, conducted by the Geneva based "World Economic Forum", India occupies a lowly 28th position on price to quality parameter, 38th on the global benchmarks of TQM practices and 40 on the customer orientation. At one side, the world class companies are laboring to achieve zero defect status, on the other, the Indian companies are still strengthening to reduce their rejection rates. For example, a colossal Rs. 6000 crore of products- 5% of country's 120,000 crore of Indian production in 1993-94 ended up in scrap heap. What, then, can save India from such a cataclysm? No global capacities, not all the mantras of globalisation, not all the restructuring exercises, not adherence to core competence, not downsizing, not diversification. The truth, simply, is that Indian companies need a Quality revolution through TQM.

1.3 Relevance of The Study

Different theories mentioned for TQM are by no means all possible approaches to TQM but these are simply the most important paradigm shifting milestones on quality adventures until now. Each organization operates with different types of people, in different markets, in different kinds of environment and has different kinds of sophistication and maturity. So there is no universal answer on the approach as to how TQM can be implemented.

Quality guru Philip B Crosby, described the so called Japanese quality model as something, that exists mostly in the imagination of the media. He says that the Japanese are not like others in that they struggle hard to learn, but the media writes about quality as an embedded idea, that there is some system that, if properly applied, will cause quality to happen. That is why there is so much emphasis on the Japanese model, TQM, ISO, Deming's 14 points, Crosby's framework etc. But the reality is that there is no system for anything in management.

However there is hope. All the TQM practices can be categorized into two areas- first being behavioral changes and second being deployment of statistical tools. The works of Deming, Juran, and Crosby can be collectively summarized [Powell, 1995] into committed leadership, adoption and communication of TQM, close customer-supplier relations, benchmarking, increased training, open organization, employee empowerment, zero defect mentality, measurement, statistical tools as Statistical Quality Control(SQC), Statistical Process Control(SPC) etc.

All these practices facilitate to embed quality culture in every field of working in the organization. There has been a lot of work in the past on what changes should take place with the aim of behavioral changes and on second category, i.e., deployment of statistical tools. But there is less work done on the practices that make the behavioral changes happen.

The aim of this research to study these practices in an Indian company. The study focuses on TQM implementation practices that Indian companies are putting into work, the process of adapting and implementing TQM, taking a case study of INDAL-Hirakud.

1.4 Research Objective

The research objective is to study the organization changes necessary in the process of TQM implementation.

1.5 Research Questions

1. What are the organizational changes necessary for TQM implementation?
2. How are these changes implemented and the ground practices to implement them?
3. What are the impact of the changes?

1.6 Plan Of Thesis

The thesis report consists of 6 chapters. The first chapter has described the rationale of the study, research objectives, research questions, and plan of the thesis. The second chapter describes the view points of different researchers since the onset of TQM to present time. Research framework and propositions are presented in third chapter. The fourth chapter covers the case. The case is analyzed in the fifth chapter. The last chapter covers the conclusions, limitations of the study and the scope for further research.

LITERATURE SEARCH

2.1 Introduction

This chapter presents the literature review on Total Quality Management and derives research framework from the literature. The literature search has been done on different aspects of TQM.

2.2 Literature Search

2.2.1 Commitment of Top Management

Successful implementation of TQM is often reported [Zairi, 1991] to be largely due to the actions of a champion, the commitment of senior managers, the vision of people at the top, good strategists, and strong leadership. Committed leadership (towards quality initiatives) is a primary requirement for TQM performance [Besterfield, 1995].

TQM requires people with vision, who have a strong desire to want and make things happen. Effective management is therefore the best approach [Zairi, 1991] to combine management with leadership. Effective management (strong leadership + strong management) has been described [Townsend, 1984] in different ways, having characterized as being available, humble, inclusive, humorous, fair, tough, effective, decisive, and patient. Managers have to be encouraged to take an outward focus and bring about change. Leaders on the other hand have to be encouraged to take an inward interest in the detailed operations of their organizations. Leader, it has been suggested [Wall & Zeynel, 1991], need to play the combined role of a coach, cheer leader and captain of a team relay race in context of continuous improvement. In context of TQM, continuous improvement should encompass the establishment of an effective management style strong in management and strong in leadership [Zairi 1991]. To generate commitment necessary to transform an organization onto one that

pursues quality in every field needs the direction and support of top management. Crisis and vision¹ are the two sources for this. It is the top management that decides which to pursue. If the leaders realize that there is no potential crisis before the organization [Besterfield, 1995], they take the route of vision to rally the point of quality improvement. A vision can stimulate leaders and followers both to expend the energy needed to transform the organization. When vision becomes deeply shared within the organization, it works as a stimulant to effort needed to achieve the goal created by vision. (Like IBM's service, Polaroid's instant photography).

Dr. Deming's system of profound Knowledge² seeks to explain some paradigm shifts for organization success in the 21st century. One of the paradigm shift necessary is "to create a win-win environment, not a win-lose environment". The focus of win-win environment is optimization of all the stakeholders in organization system of interdependent stakeholders. The responsibility of this effort falls on leaders. They should take into cognizance of the fact that they cannot hurt any constituent's interests. The other paradigm shift necessary is "to manage with a long term process and result orientation, not with a short term result-orientation only". This will promote improvement & innovation in the organization processes. Highly capable processes [Gitlow & Gitlow, 1994] facilitate prediction of future and consequently, a high likelihood of achieving the organization mission. This calls for leaders to devote more of their time to give a direction to the organization and delegate day to day decision making authority downwards. It has been emphasized that continuous improvement requires strong involvement from the top. Juran for instance, insists on the formation of Quality Circle represented by Senior management team. Senior management have to look for 'golden nugget' on the shop floor by listening to and involving employees [Imberman, 1986]. This is perhaps a useful opportunity in creating an employee

¹ A vision is an idea of outlook of the organization in future. It is a realistic picture of what the organization wants to become and what is possible.

² In his thesis, Dr. Deming presented following principles-

- Appreciation of a system- Realize that a system is a collection of interacting components. Emphasize on optimizing the whole system.
- Theory of variation- Reduce system causes of variation and leave inherent variation.
- Knowledge is not information- But it is an ability to predict the future with risk of failing and explain past events without fail.
- Knowledge of Psychology- helps managers to understand the correct composition of intrinsic and extrinsic motivation.

climate based on mutual co-operation and trust and therefore could be considered as a first step towards cultural change.

While implementing TQM, quality councils³ should be formed by the top management, members of which are all top management people, respective heads of the departments, quality experts and coordinator etc. The functions of Quality Council are many, like, to develop core values, mission & vision statement and quality policy statement⁴, develop strategic plans based on goals(long term) and objectives(short term), develop training & education programs with an eye on TQM principles and problem solving abilities for all the employees, determine & monitor continuously cost of poor quality, establish cross functional/departmental teams depending upon task, monitor TQM progress, provide the resources etc., improve performance appraisal system with a view that intrinsic motivators bring out the best in employees and give the pride of workmanship to employees [Besterfield, 1995]. It has been concluded [Donnel & Donnel, 1987] that management style and commitment are the most important determinants of quality circle usage and effectiveness. Commitment, according to most writers is managing knowledgeable workers, liberating the mind so that it becomes creative and fostering a positive climate fit for human development, human existence and human potential exploitation. The commitment required to empower, rather than eviscerate, improvement efforts is no less than vigorous and informed management involvement from the very beginning and the view that quality issues are inseparable from general strategic planning. Well-intentioned but uninformed efforts do not suffice [Gilbert, 1990].

Five factors can be specified [Martin and Nicholas, 1984] which should make the generation of high commitment a more plausible goal in organizations. These are :

1. An awareness of overriding importance of company's mission and goals.

³ To provide an overall drive to quality improvement programme, a quality council is established. Generally the members are CEO, First line of managers, Functional heads, Quality Expert(co-ordinator/consultant).

⁴ The VISION statement is a declaration of what an organization look like in future.

The MISSION Statement answers the following questions : who are we, who are the customers, what we do and how we do it. It describes the organization's function.

The CORE values of the organization reflect the culture of the organization.

The QUALITY POLICY STATEMENT provides a guide for everyone in the organization as to how they should provide products and service to the customers.

2. A major increase in disclosure in information.
3. The devolving of responsibility for quality to the shop floor.
4. Reassertion by management of its basic right to manage.
5. Elimination of status differentials - a move away from a "them and us" culture.

These five major changes result from placing more and more faith in people, and communicating more information to the workforce to make them realize what the organizational objectives are and why their individual contributions are valued.

TQM requires the leaders to lead by example. There should be no mismatch between leaders actions and voice otherwise people have a strong tendency to regard any nice declaration from leaders as another rhetoric [Besterfield, 1995]. According to a survey [Yearout, 1996] in high performing organizations on TQM front, strong, hands-on leadership (managing by wandering around -MBWA and not sitting in closed door offices) by the CEO is indeed a critical predictor of success in gaining measurable process improvement. The role of first line supervisors of the department or the work group level becomes critical to see that the improvement objectives are constantly pursued and achieved. Another effort needed from leadership side is to align the goals of the employees with those of organization. Employees have to be made to understand the connection between their job function and larger corporate goals. When goals of employee and the organization are aligned, employee take active ownership of their work, acting on their responsibility to continuously improve the way, they get the work done.

Workers expect clear direction and guidance from the individuals who are at the helm. So leading does not imply for managers to abdicate the responsibilities of planning, organizing, and controlling. A measurement by which lower staff traditionally measures the manager's commitment to quality improvement efforts, is manager's ability to successfully allocate sufficient resources to affect quality change. The dissonance between empowering a work force to affect change and supplying necessary resources [Bonvillian, 1996] have much more profound impact on the image of leadership as well as ultimate effectiveness of quality initiatives.

The arguments above show that top management role is very important for successful implementation of TQM. Top management has to realize that they have to sell the idea

of TQM to the employees. One simply cannot do it by imposing TQM concepts on someone. Therefore,

"TQM requires visible commitment of top management towards quality improvement programme".

2.2.2 Performance Appraisal, Reward, and Recognition

Edward Deming, a tireless apostle of quality, blames performance appraisal for poor quality. In his typically animated fashion, he has denounced them as one of the several deadly diseases afflicting western management [Deming, 1982]. He identifies many problems with performance appraisal as they nourish short term performance, and annihilate long term planning, detrimental to team work, destructive to the individual being reviewed, focus on end products, do not reward attempt to improve the system or take risks etc. However, organizations will not abandon performance appraisal to improve performance, strengthen communication, help reward employees fairly and provide legal defensibility. However looking at a different set of performance characteristics [Graber, Breisch, Breisch, 1992], performance appraisal can be beneficial. As suggested performance appraisal should be on the following lines :

- They should be devoid of arbitrary or excessive numbers and percentages.
- They should not be comprehensive. Expectations should be developed for job enrichment and participation.
- It should be criteria based and employee should not be evaluated against each other.
- It should define outstanding performance.

Total Quality Management wants employees to actively search for avenues of improvement in his/her work. That means to be thoroughly involved in what you do. Employees should continuously search for avenues of quality improvement. For making efforts continue in the organization, efforts need to be positively reinforced by rewards. Traditionally, organization give performance based monetary rewards. Like in typical manufacturing organization, workers are given bonus based on production

targets. In other departments, people are given incentives simply on the basis of subjective judgment of the superiors. Organizations take into consideration [Fox, 1993] only Hygiene Factors in Herzberg's motivation theory (Relation with supervisor, salary, relation with peers, personal life, status, security) or existence group of needs in ERG theory of Alderfer⁵.

According to some research, immediate and unpredictable rewards/recognition have more impact than the routine bonuses. In addition to annual/monthly incentives, efforts of the employee should be recognized by arranging public ceremonies or should be rewarded and his effort should be publicized. This will help in reinforcing the spirit of the effort. The recognition by leaders goes a long way in motivating employees [Besterfield, 1995]. Senior managers must find time to celebrate the success of their organization's quality efforts, by personally participating in award and recognition ceremonies. This activity is an excellent opportunity to reinforce the efforts in direction of quality improvement. For example in IBM hired Adgap to study the recognition program at a marketing branch office [Carder & Clark, 1992]. The study concluded that existing cash recognition should be continued. Withdrawal would be viewed by employees as a pay cut. Therefore IBM developed a concept called 'Trifacta' to improve the effectiveness of these cash awards. It consisted a three part process to make cash more effective. The employees received the cash as before but now a gift in the form of flower or steak was sent to home to surprise the recipient. The recipient was provided with an experience to remember the award by show tickets, dinner etc. IBM also adapted peer to peer reward or ETHYL(Encourage the Heart with Your Leadership) award that address several of the observed deficiencies in the recognition process including recognition of few employees due to a process that is too bureaucratic; opportunities for awards not extended fairly to all employees; desire to

⁵ There are three groups of core needs: existence, relatedness and growth. The existence group of needs include our physiological needs like hunger, thirst etc. and our safety needs like security & protection from physical and emotional harm. The relatedness group of needs are social needs like affection, belonging, acceptance and friendship etc. and external esteem factors like status, recognition and attention. The growth group of needs like internal esteem factors such as self respect, autonomy, and achievement etc. and self actualization, i.e., achieving one's full potential and self fulfillment. Alderfer prescribed that more than one group of needs may be operative at the same time.

have awards other than cash; relationship between management and customer satisfaction etc.

The reward process should also be compatible with needs of relatedness and growth group in ERG theory of Alderfer. The reward process tend to satisfy the social interaction requirement of individuals(to be satisfied) and the desire for personal development. Combining ERG theory of Alderfer and Herzberg's motivation theory, it can be inferred that people's actions and aspirations are governed as much as their social needs by direct economic motives. Unless they are in a economic distress, their social needs will dominate. In particular, people will behave in a way they feel is expected by the group they belong [Fox, 1993].

In performance appraisal of the individual [Yearout, 1996], his/her efforts in improving quality of his/her work should also be taken into consideration. They are made to understand the link between their jobs and achievement of larger corporate goals. So now the employees recognize and act on their responsibility to continuously improve their work process. The theory above guides to propose a change in the reward process of the organization. In addition to monetary incentives, reward process should be focused to increase the recognition of the people and their efforts. Awards should be given to individuals who have been able to give even slight improvements and should be widely publicized. Therefore,

"TQM calls for a change in the reward process of the organization, to focus on the recognition(social) needs of the individual".

2.2.3 Organization Structure

The key to TQM performance [Powell, 1995] lies not in TQM tools and techniques like benchmarking and process improvement, but in intangible, behavioral factors like leadership, organization skills and culture. TQM calls for an unwavering focus on continuously improving every process. A good method for focusing on continuous improvement is Deming's PDCA(Plan, do, check and act) cycle. Employees should continuously follow PDCA cycle to improve the processes. But to maintain the focus, it will be imperative for people to own the process. This in turn calls for empowering

the people. If people have control over the processes, they will go for improving the condition/state of the process [Besterfield, 1995].

Along with operational excellence, some new criterion like employee commitment to improvement goals are being used for measuring organization performance. Empowerment goes a long way in generating employee commitment to improvement goals. Empowerment here implies to the delegation of decision making authority regarding changing his work and involvement in decision affecting his work like purchase of new material/machine, subordinate recruitment etc. Empowerment also provides more opportunities to employees, thus increasing the scope for improvement as more and more decisions about the work are being taken by whoever performs it. Increased employee involvement in design and planning of the process (on which employee is working) and greater autonomy in decision making are key to TQM performance [Yearout, 1996].

TQM also recognizes close and constant watch on rapidly changing customer requirements and needs to maintain the responsiveness. Organizations need to respond rapidly to changing conditions at the point where the change is taking place. That means decision making authority should go downward to the point where marketing and manufacturing can coordinate better and be fast responsive. This is necessary because if the change detected by marketing people is not taken into consideration rapidly by manufacturing, the marketing effort in detecting the change is wasted. This typically happens if the power to act upon the information lies upward in the organization. However decentralization aims at eliminating this problem. In addition to fast responsiveness, decentralization provides detailed input to decision making process because high level managers only get filtered information. Moreover professionals and skilled employees are being more and more valued today in an era of specialization. They typically want to participate in decision-making processes about the matter affecting their job. So involving them in the decision-making process will certainly motivate them and it will also make them more accountable to goals set as they have been involved in the goal setting process. Decentralization will provide greater motivation to such employees. Thus it will naturally help the organization in retaining such employees [Robbins, 1995]. TQM recognizes [Besterfield, 1995] training impetus for improvement efforts. It calls for both on-the-job training and

classroom inputs depending upon the nature of the job. Decentralization will increase the opportunities of learning for low level managers and therefore adds to their training which are very necessary to cope up with the varied challenges organization has to face. This type of on-the-job training is very necessary as the same low level managers will go up the hierarchy to lead the organization in the future. [Robbins, 1995].

Along with the delegation of decision making authority downwards, employee should be clearly conveyed where the decision-making prerogative begins and ends for the individual. The result of empowerment efforts show that early zealous efforts are normally devoid of the necessary direction and guidance that would have helped employees fully understand their decision making boundaries [Bonvilian, 1996]. Therefore,

"TQM calls for empowerment of people, i.e., it requires more decentralization".

2.3.4 Group Activity

A key element for improving quality is to stimulate people to think about their own jobs in fresh ways, for them to be receptive to changes in working practices and to be encouraged to contribute their knowledge and ideas in cause of quality improvement. Participation techniques [Fox, 1993] like quality circles aim at removing the barriers to people in doing their job effectively and encouraging them to work smarter, not harder. People's behavior is directed towards goals which they have set themselves or which they have accepted freely from others and which reflect their own values and desires. General motivational techniques like pay, security of employment, paid holidays, productivity incentives satisfy only needs that fall in existence group of needs in ERG theory of Alderfer or the needs that are lower in Maslow's hierarchy of needs. Real motivation comes only when in addition to satisfy lower needs, techniques are employed to satisfy higher needs in Maslow's hierarchy or Motivators in Herzberg's theory. Quality circles are such a technique. Its purpose is not employee satisfaction but problem solving. But inherent in it, is participation and decision making by individuals and also conformance to group behavior.

As jobs become more complex [Robbins, 1995], management doesn't know everything what their employees do. So participation allows those who know the most to contribute. Also interdependence in tasks that employee do today, often requires consultation with people in other departments and work units. This increase the need for cross functional teams to resolve the issues. Participation provides intrinsic rewards for employees. It can make their jobs more interesting and meaningful. The arguments presented here suggest to increasingly use groups for conflict resolution, decision making and quality efforts. People who know best about jobs are the one who perform them. So they should be thoroughly involved in the decisions regarding their work.

It is also suggested [Besterfield, 1995] that participation should be voluntary. In HP, whenever a problem area is identified, nominations are invited for problem solving team. Voluntary participation generates more commitment, more ownership and more motivation. Firms are unlikely to adopt TQM practices in short term if existing employees lack team orientation and do not accept training. Empowered work teams are necessary for high performance on TQM front. Teams are regarded as key learning units in the organization [Georges & Ronne, 1995] now, as they provide "communities of commitment" in which free and creative exploration of complex and subtle issues is possible. They absorb and produce novel information, i.e., innovative ideas. They are horizontal information systems and they enter into exchange with the environment faster than any other known human system. So the teams are necessary if we look at TQM concept of close link with environment. Therefore,

"TQM identifies group activity(like quality circles and cross-functional teams) as major source of improvement".

2.3.5 Customer Supplier Relationship

According to Deming [Besterfield, 1995], quality means anticipating the future needs of the customers. Customer satisfaction must be the primary goal of the organization. Customer of an organization is anyone who purchases/patronizes for the purpose of receiving products/services. Every employee if he knows the effect of his work on needs of external customer, will be more sensitive to external customer. It has been identified that viewing every department in organization as internal customer of the

preceding department, one tries to meet the expectations of the next person and so form a chain of efforts of internal customer satisfaction which leads to satisfaction of external customer. Top performing organization on TQM front [Yearout, 1996], not only pay close attention to capturing customer satisfaction data to guide quality improvement effort but also to improve , redesign or otherwise change the process.

Customer -Supplier chains are however the most critical issue for TQM. The business cycle under TQM is extended beyond the boundaries of traditionally structured organizations [Zairi, 1991] where control of quality is very much localized. Some research work which looked at the evolution in customer-supplier chains in automobile industry [Lamming, 1986] has led to the conclusion that there are various stages of evolution in establishing strong relationships between suppliers and customers which include friction, tolerance, common understanding, complete partnership. The positive evolution was characterized by four models which include- the traditional model, the stress model, the resolved model, and the Japanese (Zaibatsu) model. The main facilitator in this transition was found to be common understanding and the ability to compromise. The Japanese model assumes that there is a strong relationship between a customer (original equipment manufacturer-OEM) and a supplier (first-tier). The latter manages their own relationships with the suppliers with whom they have established long term partnerships (second-tier), and so on. A study [Noori & Blenkhorn, 1990] which compared the Japanese approach towards customer-supplier chains based on 'Zaibatsu model' and the American approach of establishing customer-supplier chains has concluded that there are six main factors which distinguish American approach from the Japanese one. These are :

- Independence of customers from suppliers (OEM): Lack of synchronization, desire to remain independent.
- Selection of suppliers based on price quotation: therefore multiple sourcing is the easier alternative.
- Less producer/user interface.
- Zero Defect policy : Emphasis on quality control rather than "built in quality".
- A forced Just in Time Delivery: Half hearted effort, carried out because of pressures rather than a firm belief in its possible outcomes.
- Less emphasis on innovation : Less abundant innovative thinking because of limited exchanges.

The study clearly highlights that single sourcing can be rendered possible if some of these criteria in the Zaibatsu model are applied [Zairi M. 1991]. The starting point is successfully establishing customer-supplier chains based on single sourcing, seems to be the choice of a small number of first-tier suppliers. Many companies in the west managed to achieve it as Xerox reduced its suppliers by 50% and started to involve its suppliers much more closely in product design process and started to share a long term information with them. Xerox had demanded a high commitment to quality, innovation and continued effort to reduce costs from its suppliers. On the other side information and behavior are the two factors for establishing full customer commitment. It has been argued [Ulrich, 1989] that total customer commitment occurs when information is followed by behavior in the form of customer involvement and participation in organizational activities. Loyal customers provide high profit, repeat business, high market share and referrals [Laura, 1996]. Loyal customers are continuous source of income that leads to higher profits. Getting customers involved in design and development of a product also enrich a lot more than customer satisfaction requirement. Around 80% of the successful new products and services come from customer ideas. So one should ask customers about their liking while searching a product and wants still unsatisfied. Ford Motor Company, in building 1994 Mustang model, invited 200 loyal customers to be a part of its design team. The total result was that Mustang was in market in 25% less time and 30% fewer dollars spent on any comparable development programme on Ford's recent history. So pains should always be taken to build customer loyalty.

Customer commitment is usually followed by collaboration which leads to the establishment of a partnership. Collaboration means that both parties represented share the power to dictate changes equally. Collaborations lead to full partnerships where performance can be improved through joint efforts on a sustained and regular basis [Henderson, 1990]. Similarly, to obtain high quality products and services [Besterfield, 1995] is to work with suppliers in a partnering atmosphere to achieve same quality level as attained within the organization. Organization and the supplier have the same goal to satisfy the end user. The better the supplier's quality, the better its long term position because organization will be able to strive for new goals of

improvement in quality. Because both organization and supplier have limited resources, they must work together as partners to maximize their return on investment.

All this theory calls for viewing external suppliers as partner of the organization and behave with them as an internal customer behaves with internal supplier. To solve quality problems within the organization, it is imperative for internal customer to work closely with internal suppliers to coordinate and direct their efforts to a single goal- to build quality in the product. The same concept applies with external supplier and the organization concerned also. The only reason why internal supplier and internal customer, generally work out a solution to their quality problem is being a single internal supplier for an internal customer for requirement of one item, and so, better coordination. Similar should be the situation between external supplier and the organization. There should be single sourcing for one item. That results in long term contract and a partnering relation with a guaranteed future volume for the supplier and the supplier can direct his resources to quality improvement efforts. For the organization, the advantages are reduced cost, complete accountability, supplier loyalty, partnering and a better end product with less variability.

With increasing emphasis on JIT application, it is becoming more and more imperative for the organization to view supplier as part of company wide supplier-customer chain. Under JIT, customer supplier chains are encouraged to move away from the adversarial approach to a collaborative approach [Stevens, 1988; Lee , 1987] with mutual benefits for suppliers and customers. When you view your internal supplier same as external supplier, you tend to become more efficient in providing the product or service as supplier and when you view your external supplier same as your internal supplier, it is more likely that he will be sharing your vision towards business. Then you can better direct the efforts of quality improvement. Therefore,

“TQM calls for viewing the organization as a customer/supplier chain starting with external supplier and ending with external customer with middle links being internal customer/ supplier”.

RESEARCH FRAMEWORK AND METHODOLOGY

3.1 Research Framework

The research objective (Section 1.4) is to study the organizational changes necessary for successful implementation of TQM. The changes required in the behavioral areas and in the area of deployment of statistical tools in the organization, have been explained in the previous chapter. However the present research focuses on the changes in the organizational issues that help in transforming the behavior. The key areas of change that have been identified from the literature, are as follows:

1. Commitment of the top management,
2. Organizational Structure,
3. Performance Appraisal, Reward, and Recognition,
4. Group Activities,
5. Intra - Departmental Relationship,
6. External Supplier Relationship,
7. Relationship with Customers.

The focus of the study is shop floor and relationship of it with staff functions. The research aims at exploring the changes in these seven areas in the organization.

3.2 Research Methodology

We have adapted a qualitative approach to the research. Among the various methods for doing qualitative research, case study method has been selected. The following sections explain the rationale of adopting case study method for the research.

3.2.1 Choice of Approach

Literature indicates that studies in social sciences typically have the following characteristics :

- Events take place over a long period of time.
- It is difficult to isolate, identify and characterize the causal events or situations as these may be inter-related driving one another, or the facts may be embedded in their historical perspective, or are stated in terms of subjective experience.
- Explanations are probabilistic in nature.

Therefore a wide range of research strategies are used in social sciences. Literature indicates use of the following research strategies [Yin, 1984]:

- Experimental investigations,
- Survey research method based on questionnaire and interviews,
- Manipulation of secondary data,
- Historical studies, and
- Case studies

The present research concerns the process of TQM implementation and the organizational changes (Section 2.2) necessary for TQM implementation. It needed to cover events and situation that occur over a period of years before and after TQM implementation. The study is concerned with

1. What are the organizational changes that have taken place in the organization for TQM implementation?
2. How are these changes implemented and the ground practices to implement them?
3. What is the impact of the changes ?

The Study attempts to understand the perceptions of different constituencies in the organization viz. top management, middle management, supervisors, workers and union (if exists). The hindering and facilitating factors with respect to each of these changes have been aimed at to be elicited. The study heavily relies upon the memory and the experiences of the people. Since the research questions are of "How" and

“What” type, it was felt that case study method would be most appropriate method to conduct the study.

3.3.2 Selection of Case

The unit of analysis for the case study was the process of TQM implementation in an organization in terms of the change areas specified in Section 2.2. The criteria on which primary search for the cases was done are as follows :

- The firm should have a TQM programme, and
- The TQM programme in the firm, should be at least 3-5 years old (from literature, it has been identified that an organization normally takes more than 5 years to show results of TQM programme [Zairi, 1991]).

On these criteria, a sample of firms were selected among Indian organizations. A formal approval was taken to conduct the research in the organization. Only one organization was studied due to time limitations.

3.2.3 Data Collection

A check list of questions was prepared based on the research framework (Section 3.1), with the help of available literature on TQM. While preparing the checklist, due attention was paid to keep the questions in the sequence in which they should be asked to get a better picture of the process. A prior appointment from the personnel in various departments of the firm was taken before approaching them for interview. Data collection was done through unstructured interviews based on the checklist. We took notes of conversation during the interviews, and almost always made a fair copy of these as soon as possible in order to avoid any loss of data on our part. Apart from this, data was also collected through :

- Company Documents,
- Organization Charts,
- Company Magazines,
- Financial Reports etc.

For interview purpose, the views of different constituencies of the organization were taken. For this purpose, the organization (See Appendix 4.4) has been divided into four constituencies:

1. Top Management (Works Manager and Functional Heads).
2. Middle Managers (Superintendents, Assistant Superintendents and foreman)..
3. Supervisors and Operatives.
4. Union officials.

3.2.4 Data Analysis

The case has been described with a view to bring out the different aspects of TQM implementation in the organization. The data has been analyzed in the light of research framework. The factors were tried to be summarized and analyzed under the seven areas that have discussed in the research framework. The analysis has been done with a view to bring forth:

- The level of changes in these areas before and after TQM implementation,
- The effectiveness of the steps taken by the company in these areas and
- The differences in opinions of different constituents in the company and their reasons.

CASE STUDY AT INDAL-HIRAKUD

4.1 COMPANY

INDAL is one of the largest private sector companies in India and is the pioneer company of India's Aluminium industry. It is the third largest and the only multi-locational Aluminium manufacturer in the country. INDAL was incorporated on 17th December, 1938 under the name of Aluminium Production Company of India. In 1944, the name was changed to Indian Aluminium Company and in 1945, the company became a public limited company. The company enjoys the support and wide ranging co-operation of Alcan Aluminium Limited of Canada. Alcan is the major share holder with around 38 % equity stake.

The company witnessed an explosive growth since it's inception with 14 plants and 10 offices spread all across the country today. INDAL owns 2 bauxite mines, 2 Alumina manufacturing plants, 3 smelters, 4 fabricating plants, 4 sales and administrative offices [Appendix 4.1] at different locations and a Head Quarter at Calcutta.. INDAL has 4 associated companies in the areas of exports, extrusions, and process technologies [Appendix 4.2]. The multi-locational set-up helps INDAL save on costs as well as cater to local demands more efficiently.

The company is setting Alumina project at Utkal in Orissa which will be the lowest cost Alumina plant in the world. Recently it has diversified to power generation and electronic components to rapidly reach a leadership position in the field of professional grade in PCB. INDAL's largest smelter capacity of 72,000 tonnes per annum at Belgaon had to be shut down following a sharp rise in the power tariff by the Karnataka government. The company has also finally decided to set up a 100 MW naphtha based captive power plant.

4.1.1 Products

The major products of INDAL include :

- Alumina (Al_2O_3),
- Aluminium metal,
- Fabricating products (Includes sheets, extrusions, and foils),
- Printed Circuit Boards.

The company is vertically integrated through every stage of industry including Bauxite mining, Alumina refining, Alumina smelting, semi fabricating, and product development. INDAL produces only half its requirement of primary metal and procures the rest, despite having more than sufficient smelting capacity.

Table 4.1A: Share In Sales Revenue

BUSINESS	SHARE
Sheet	50 %
Chemicals	18%
Foil Packaging	11%
Extrusions	8%
Metal, Carbon and power	7%
Electronics	6%

Source : Company documents

Unlike its major competitors, which are primarily Aluminium producers, INDAL is mainly a downstream producer. It has a strong presence in the Aluminium foils business. Around 95% of INDAL's turn over comes from value added products.

4.1.2 Hiarkud Smelter

The assurance of adequate electric power supply from Hirakud dam project and its relative proximity to Bauxite mines at Lohardagar and INDAL's Alumina plant at Muri were the factors which led to the location of this smelter at Hirakud. The plant was installed in April 1956 and in a record time of 3 years in 1959, the plant started operating with an annual capacity of 10,000 metric tonnes. In 1961 the capacity was increased and has presently reached to about 30,000 metric tonnes per annum.

Because of the closing of the Belgaum smelter, 44 smelting pots have been transferred to Hirakud which has further enhanced its capacity by 6000 tonnes.

INDAL Hirakud has put up a coal based 67.5 MW power plant at Hirakud to meet the high requirement of power for Aluminium production. The plant is filled with liberally designed electrostatic precipitators, a 130 metre high concrete chimney and a dense pneumatic ash handling system in 1993 with an investment of Rs 2000 million. The plant is going for the continuous castor system, that eliminates the intermediate activities of rolling ingot casting, preheating, scalping, and hot rolling since the molten Aluminium is directly cast as strips of 5-10 mm thickness and can be rolled to desired thickness. This is done to compete in the global market as its competitors are using this technology since a long time. The plant has state of the art R& D section which is self sufficient in itself, latest thyristor converters - first of its kind in the country, and environment friendly Scrubber.

4.2 FINANCIAL PERFORMANCE

In fiscal 1995, INDAL's turnover rose from Rs 691.04 crores in 1993-94 to Rs 1,049.49 crores at a CAGR of 24.23%. The operating profits went up from 82.12 crores in 1992-93 to about 209.12 crores in 1995-96. Although its material costs as a percentage of sales dropped from 37.51% in 1994-95 to 32.17% in 1995-96, its power costs increased from 17.51% to 20.12%, mainly due to the fact that its Belgaum smelter was re-energised during this period. With a debt-equity ratio of less than 0.5, and strong internal accruals, INDAL is in a position to fund its latest projects without any equity dilution. CRISIL (Credit Rating and Information Service of India) has given, FAAA (highest) ranking to INDAL for its FD program and a PI rating for its commercial paper program. INDAL had two good years upto 1995-96. Firm prices on the London Metal Exchange (LME) did not have any impact on INDAL's performance, basically because it had already entered into long term tolling arrangements whereby the company exported Alumina, got it converted into Aluminium by paying job charges and re-imported Aluminium back home. Despite higher input prices and lower production levels, INDAL's performance is strong as it is pre-dominantly a secondary producer. In fact, the company's margins on its

downstream products may improve since INDAL is a net buyer of metal from the market and hence, can cash in on lower international prices of Aluminium.

Table 4.2A : Sales And Operating Revenues

Year	95-96	94-95	93-94	92-93	91-92	90-91
Sales (Rs Million)	11,846	10,446	8,386	7,787	6,723	5,816

Source : Company documents

Table 4.2B : Profit After Tax

Year	95-96	94-95	93-94	92-93	91-92	90-91
PAT (Rs Million)	1,500	956	542	447	471	764

Source : Company documents

4.3 MANUFACTURING PROCESS

Aluminium is never found in metallic state and found in combined state with silicon and oxygen. The ore is called Bauxite. Once the ore is mined, a chemical process is used to extract Alumina (oxide of Aluminium) and an electrolytic process reduces Alumina into Aluminium. Around 4-5 tonnes of bauxite is used to extract 1 ton of Aluminium.

Chemical Process : Crushed bauxite is mixed in a solution of hot caustic soda in digesters which allows Alumina hydrate to be dissolved from the ore. After the "red mud" residue is removed by decantation and filtration, caustic solution is piped into hung tanks, called precipitators, where the Alumina hydrate crystallises. The hydrate is then filtered and sent to calciners to dry and under very high temperature, is transformed into the fine, white powder called Alumina.

Electrolytic Process : Al and Oxygen are separated by electricity in the smelting process. The reaction takes place in carbon lined large tanks called "pots" through which a direct current is passed. The bottom of each pot which acts as a cathode, and Carbon blocks are suspended into the pot act as anode. Due to electrolysis process around 40% of the cost of Aluminium is of power. Therefore the need for adequate and cheap power supply is a very important factor for Aluminium manufacturing.

Casting and Fabrication : Before casting into ingots for fabricating, the molten Aluminium is treated to ensure for cleanliness and purity. For this alloying agents are added. Metal is then cast into various shapes and sizes.

The manufacturing process at INDAL-Hirakud is shown in Appendix 4.4, and Figure 2.

4.4 ENVIRONMENT

4.4.1 MARKET

Aluminium is one of the most heavily used non ferrous metals in the world, with its global consumption in the 1990's estimated, on an average, at 17.28 million tonnes per annum (tpa). The domestic Aluminium consumption ranges between 525,000 tpa and 550,000 tpa which is just 4.18 % of the world trends. Even though India is the sixth largest producer of Bauxite in the world- the primary raw material from which Aluminium is made, it has an insignificant share of global production of Aluminium. This is because of the high entry barriers in this industry. These are :

- The production of aluminium was licensed by the state. Although the government of India's efforts were aimed at controlling the prices and the distribution of this key raw material till 1991, the returns on investments in this sector became rather less attractive. Another factor that restricted the growth of the industry was the adverse excise duty structure till the late 1980's.
- The second factor that has limited the growth of the industry are the restrictions on the import of foreign capital and technology that deprived the majors of the benefits of both quality and volumes.
- Thirdly in the licence-permit raj, nearly 50% of the aluminium produced in the country was utilised by the cable and conductor industry
- Finally the production of aluminium is energy sensitive, the availability of power in this country has been, a constraint. Approximately 1 ton of Aluminium requires 16000 Kwh of power and roughly accounts for 35 to 40% of its cost of production. Electricity is one of the major components of the cost of aluminium. However there was a historic impediment in the form of a restriction on the setting up of a captive power plants by the aluminium producers., which has been subsequently removed.

One hurdle the domestic producers face is the weak sentiment prevailing on the LME as a consequence of the copper crisis of the 1990's. Although there has been no news which directly affects the industry, the metal is being traded at weak and hesitant prices in response to the prevailing sentiment. Business Today analysis reveals that Aluminium prices on the LME solicited between \$ 1000 and 1.250 between 1991 and 1994. This was mainly because of the pile up of stocks of Aluminium from around 500.000 tonnes in mid 1991 to around 2,650,000 tonnes in mid 1994. After the major producers decided to control and limit their production, the aluminium stocks started falling down. In turn, aluminium prices started moving up, with their levels crossing \$2,000 when stocks dipped below 1,700,000 tonnes in January, 1995.

4.4.2 Potential of The Market

There is a tremendous scope for the demand for aluminium to grow. India's per capita consumption is a mere 0.50 kg per annum as against 2.80 KGs in Mexico and 7.60 in Spain. In the developed world it is at around 58.90 KGs in US, 69.70 in JAPAN and 26 Kg in Germany. This disparity arises mainly because of the extensive use of Aluminium in the canning of beverages, packaging, and in automobile industry in the developed country. And it is more so because developing countries use more copper than Aluminium for the transmission of power. The power sector is the largest consumer of Aluminium, with demand from this sector accounting for as much as 40% of the total demand. While Automobile account for another 20%, packaging and construction account for just 10% each. Nevertheless, India is moving in line with the international trends, with the share of power sector in the consumption of aluminium dropping from 60% in the late 1980's to less than 50% in the 1990's. Moreover, the use of aluminium in other sectors is steadily increasing.

On the supply side, production consistently fell between 1991-92 and 1993-94. Mainly, the economic recession of the early 1990's contributed to this cut back in the production. However, the industry has rebounded since then, with a 10% growth in demand in both 1994-95 and 1995-96. With an output of 514,000 tons in 1995-96, the industry is operating at 58% capacity utilisation. As the rate of growth of demand is poised to outstrip the domestic supply, India is going to be a net importer of aluminium

soon. And the downward revision of import duty from 25% to 10% last year could make this transition nearly painless.

Table 4.4A : Aluminium Consumption Trends

CONSUMPTION	Domestic	Global
(Tonnes)	499,458	17,280,000
Power & Transmission	40%	8%
Automobiles	20%	40%
Packaging	10%	25%
Construction	10%	20%
Others	20%	7 %

Source : Business Today, December 1996.

4.4.3 Competitors

There are only 5 producers of Aluminium in the corporate India. Of these NALCO and BALCO are state-owned and the three other players in the business belong to the private sector with HINDALCO being the largest of them. By virtue of the combined capacities, the three majors - NALCO, BALCO and HINDALCO account for as much as 90 % of the annual production of aluminium in the country.

The aluminium prices in India have been controlled by the three majors NALCO, HINDALCO, and BALCO. Until 1991, due to government controls, and a high excise duty structure, the industry was isolated from international competition. However, since their de-control in 1993, domestic prices have, more or less, followed international trends. NALCO continues to lead the trend, with HINDALCO and BALCO following it. For instance, while NALCO reduced its prices during recent crash in the international market, HINDALCO chose to offer cash discount.

TABLE 4.4B : Aluminium Production of Majors

INSTALLED CAPACITY : 670,000 Tonnes	Tons/Annu m
NALCO	218,000
HINDALCO	210,000
BALCO	100,000
INDAL	117,000
MALCO	25,000

Source : Business Today, December 1996.

HINDALCO : It is the largest private sector aluminium company in India, promoted by the Birla group, and is among the world's ten lowest-cost producers. HINDALCO's business interest are restricted to aluminium and secondary products only. Its product line includes mainly Rolled products, Aluminium, and Properzi Rods. In the last two fiscal years its sales rose from Rs 749.50 crore in 1993-94 to Rs 1,252.81 crore in 1995-96 at a compounded annual growth rate (CAGR) of 29.24%. The operating profits doubled from Rs 242.42 crores to Rs 569.92 crore in the same period. The sales to turn over ratio also rose from 0.40 in 1993-94 to 0.60 in 1995-96.

NALCO : It is the country's largest public sector aluminium company. With a turnover of Rs 1,602.25 crore, an Operating Profits Margin of over 50%, and a net worth of Rs 2,589.9 crore, NALCO has one of the best financial performance in the public sector. On the operational front too, it has a much better track record being the lowest cost producer in the country, and is among the top 10 exporters of Alumina in the world. Its produces only Aluminium. Dispite the adverse market conditions in the first half of this fiscal year, it managed to record a 7.90% growth rate in sales and a 17% jump in profits. Over the last two years, NALCO's net sales have increased by 52%; from Rs 1,050.85 crore in 1993-94 to Rs 1,602.25 crore in 1995-96.

Table 4.4C : Composition of Production of Majors in 1995-96

	INDAL	NALCO	HINDALCO
Rolled Products	49.44	-	21.50
Foil	12.88	-	
Extrusions	8.35	-	9.07
Properzi Rods	4.01	-	26.12
Aluminium	0.91	54.48 *	42.37
Others	24.41	-	0.94

(All figures are in percentage)

* Remaining share is of Wire rods (22.31%), Alumina (7.97%), cables (5.14%)

Source : Company Magazine.

4.5 EMPLOYEE RELATED ASPECTS

The employees at INDAL are categorised into "Management staff" and "Unionised staff". In the management staff there are 7 grades right from the post of assistant foreman to the works manager while the unionised staff starts from workers to the senior supervisor. Employees above the post of general foreman are considered as "Head Office roll employees" while foreman and assistant foreman are considered as "Local Roll employees". The total number of wage grades at Hirakud smelter are 13 and the total number of staff grades are 9 from Senior supervisor to the Guest house helper. The strength required for full line operation including scrubber (to run the plant for 216 pots in line) is around 483 in wage roll and 120 in salary roll. However the total number of employees are around 631 with 497 in wage roll and 134 in salary roll. The supervisors are considered a part of the unionised employees and are entitled for all the benefits for which the workers are entitled. The supervisors in the production area perceive that they are trapped between the management and the union. The union considers them as a part of the management. They therefore want to be considered as a part of the management staff. When asked about losing the benefits in that case they replied that they might lose overtime and 3 paid holidays but would get other benefits as salary adjustments and better job security. However in the office section the supervisors do not want to be included in the management staff as they may lose overtime in that case. They felt that the tackling with the workers is a critical problem and therefore the production supervisors want to join management staff. The personnel manager informed that the management is planning to consider the supervisors as a part of management staff though this is only a formal requirement as they consider them as a part of the management staff. The different employees levels are shown in Appendix 4.5.

4.5.1 Recruitment and Induction

The procedure for recruitment for the management staff and the unionised staff is different. However there is a minimum qualification for recruitment in each category. The minimum qualification for the management staff is a professional degree or a masters degree. The head office roll employees are recruited directly by the head office while the local roll employees are recruited by the plant authorities. The engineers, recruited for the post of assistant foreman are selected through campus interviews from

Regional and state engineering colleges. In the supervisor category, the minimum qualification at the entry level is a diploma or a science degree and they are recruited both by campus interviews and advertisement. The training period of supervisors is around 1 years, after which they are kept in probation for about 6 months. The training period can be increased or decreased based on the performance of the employee. For the clerical staff, the minimum qualification is graduation and they are given training for one and a half years with 6 months in probation. For the skilled workers the minimum qualification is an ITI certificate. They are also trained for 1 year with 6 months in probation. For the unskilled worker the minimum qualification is class 6th and they are also under training for about 1 year. After 3 months they are kept in the same grade as skilled workers. The age of retirement for all the employees is 58 years however the management reserves the right to extend the services of any employee if required. The personnel department provides training before induction to all employees in various aspects related to their work. Some of these areas include TQM, union, management, work agreement, job profile, etc.

4.5.2 Payment, Deductions and other Benefits

The permanent workers are paid on the basis of daily rates. The rates of payment also differs from plant to plant. For example in the Pot Room, the wage rates are the highest because of the nature of work in that plant. However the company reserves the right to reduce the basic wage rates in case of any economic crisis. The basic wage is reviewed atleast once in a year. The shift workers are provided extra facilities over other employees. They are allowed to take sufficient time for taking refreshments during the shift at such times determined by the person in charge. They are also entitled for 1 rest day as provided in the shift schedule. The overtime payment is twice that of normal salary. There is a free canteen facility for taking lunch and tea inside the works for all the employees including the senior managers. Employees are distributed wheat and rice at discounted rates. The company also arranges tax free loan to the employees, however the amount of loan is different for different levels. The employees are granted free medical facilities, educational allowances, scholarships, termination benefits etc.

There are three bonus schemes for workers. These are :

- Monthly incentive bonus schemes based and paid on Aluminium production during the month.
- Additional monthly incentive bonus scheme based and paid on Aluminium production during the month.
- Annual productivity bonus scheme based and paid on total output of the metal during the bonus year.

The bonus incentives are not individual and are given department-wise. The bonus is paid on slab rates which is decided in the agreement. Besides these in every three month, if there are no accident in any plant then utensils etc. are given to the employees of that plant in that period. For the supervisor level and above there are three incentives schemes :

- Annual performance award
- Business performance award
- Safety performance award

There are strict actions against indiscipline. For hourly rated workers, lateness is deducted at the rate of 0.5 hour for any lateness over 3 minutes upto 30 minutes and at the rate of 1 hour for any lateness over 30 minutes upto 1 hour. A worker who is more than 15 minutes late can be admitted for the same work period only after permission has been obtained from the supervisor. The employees can be searched by the wards with inside the works. A Public addressing system is also installed within the works to contact any person in case he is required. The assistant manager of carbon and casting plant told that above the supervisor level there is discontentment as the pay is very less as compared to other plants

4.5.3 Promotion and Demotions

There are no time bound promotions at INDAL-Hirakud. Any employee can be promoted to any level if he is capable. The promotions are based on two factors :

- At the discretion of the management as and when suitable vacancies occur. The candidates are invited for the vacancies and interviews are conducted inside the works.
- The promotions are based on the ability, experience, efficiency, spirit of co-operation, and conduct of the worker concerned and preference is given on the

basis of length of service when other things are equal.

A middle manager in the personnel department told that in one other plant of INDAL one employee joined the organisation as supervisor and he is now "Senior Works manager" in that particular plant. There is provision for demotion in the event of improper workmanship, contravention of standing orders, or abuse of positions, and other reasons and as a result of reduced operation involving a reduction of workers. The workers are transferred from one plant to other and from 1 shift to other at the discretion of the management.

4.5.4 Information to Workers

Most of the information is displayed through the notice boards. These include union notices, employee attendance, shift schedule, wage rules, bonus and welfare rules, disciplinary rules, production schedules, accident record, safety, goals, targets etc. All the notice boards are either in English or in Oriya. The monthly magazine of INDAL called "Prabha" was introduced in 1996 to increase employee's knowledge about the industry and contains articles of Aluminium prices, news from the world of Aluminium, Competitor's news, TQM activities at other plants of INDAL, interviews of top management, production news, retirement, obituary, and production news etc. Another magazine published only in Oriya is about rural development.

4.5.5 Shop Floor Management

There is a special focus on cost and safety at shop floor at INDAL-Hirakud. The safety practices are introduced through the "Hand books" to strengthen the mind set of employees on safety. To monitor safety, internal safety surveys are done every month by an internal audit team of 4 members. Each month a "Safety Horse" award is given to a department who has the highest accident free record. ALCAN has also given "Safety Owl Award" to INDAL since the last three years. There are incentives in the form of utensils etc. for preventing accidents inside the plant. These incentives are given in every three months to each department if there are no accidents in that department during that quarter. Monthly plans and tasks forces are also made for disaster management to tackle accidents inside the works. The task forces are given different names as Safety Monitors, Gas captains, Fire Marshall, First Aiders, Search

Teams and Chemicals Stewards. The accident record of INDAL-Hirakud is shown in Appendix 4.6.

In October 1996, daily surprise checking was done to see the use of personal protective equipment and it was found that the use is excellent. A supervisor in casting section informed that once a senior manager was inside the works without safety mask and a worker asked him to wear it immediately.

There is a special focus on the cost saving at INDAL-Hirakud. The plant has started calculating the cost of quality. The cost of quality comes around 30-35% of the total cost. The targets are compared against the achieved figures and the cost is calculated by seeing the difference of the two. The HK co-ordinator told that they have made a habit of switching off the lights whenever they go out. The Hirakud plant has also won the "National Energy Conservation Award" in the Aluminium sector by the Prime Minister of India in December 1996.

For better shop floor management and working conditions a number of steps are taken by the management. The goals, targets, training and development posters are displayed on the notice board near the main gate. Light music is played on the Public address system during the beginning of recess hours for relaxing the employees. The employees are also allowed to read news papers during the recess hours. Periodical supply of articles pertaining to various areas on safety, quality, general management etc. are also being supplied to the employees. The works manager told that earlier contract labours were hired for cleaning and maintaining the works when the VIP's used to visit the plant but now in 1996, anyone can visit the plant at any time without prior information. The plant manager also does weekly performance review of the plant with the department heads for better shop floor management.

4.6 QUALITY MOVEMENT

In September 1993, the top management of INDAL felt that the Hirakud plant should also go for total quality management as most of its other plants had already gone for TQM. To implement TQM, the services of "Eicher Consultancy Services" were hired in September 1993. A number of practices were introduced to make the total quality movement at INDAL, a success. These activities include quality circle activities, restructuring of training process, ISO certification, formulation of goals, mission and

vision statements, increase employee participation through Kaizen activities, joint consultation committees, house keeping, introduction of quality indicators in performance appraisal, safety, pollution, cost consciousness, quality consciousness through training and brainstorming, restructuring supplier and vendor relationships etc. The quality circle activity was the first activity to be introduced. The plant got ISO 9002 certification in September 1995 though the documentation activities started in 1994. The sequence of major events of TQM activities is shown in Table 4.6A

Table 4.6A : Chronological Order of Starting of Different TQM Activities

ACTIVITY	TIME
Consultancy Services	September 1993
Works Steering Committee	October 1993
Small Group Activities	October 1993
Kaizen	February 1994
House Keeping	June 1994
Kaizen Appreciation	September 1994
ISO Certification	September 1996
Cost of Quality Data	November 1996

Different committees and councils were formed for the reviewing of all the activities at INDAL Hirakud. These were :

- Shop councils comprised of equal number of members from union and management to discuss the grievances procedures and are 3 in number.
- Joint Council (or works committee) comprised of equal number of members nominated by the company and the union for the works related problems relating to productivity, overall efficiency of the plant, safety, etc.. It is also entitled to take problems which the shop councils can not take.
- Joint Canteen Committee Comprised of equal number of members by company and union to discuss and solve canteen related problems.
- Works Steering Committee (WSC) comprised of members nominated by the company and representatives of the union. The function of WSC is to discuss and review policy decisions, to promote TQM, Kaizen, House Keeping, and SGA's etc.

All these committees are consultative and advisory in nature and have no executive powers.

4.6.1 Works Steering Committee

Right from the beginning of TQM programme in 1993, the introduction of works steering committee was one of the first steps to review and control TQM activities and other work's related activities. The WSC meetings started in October 1993. Since then these are being held every month. The meetings start with a brief address by the Works manager. Then the agenda of the meeting is presented by the TQM co-ordinator. The different departments present the status of TQM and other works related activities as Kaizen status, Housekeeping, community development, cost of quality, Intra-departmental and inter-departmental problems, status of quality indicators, production status, training status, safety, health and pollution. The attendance of members in the meeting is not compulsory but the members are required to intimate about it before the meeting. The attendance record of these meetings is maintained. Sometimes, persons from the corporate head office and other industries are also invited to attend the meetings for improvements. The agenda and the schedule of the next meeting is decided in the first meeting itself by the TQM co-ordinator. At the end of each meeting every member is asked to rate the quality of discussions, what went wrong (www) and what could be improved (wci).

4.6.2 Departmental Steering Committee

At the department level there are department steering committees. These meetings are held fortnightly in every department. The objective of these meetings is to review the goals, targets, and quality indicators concerned with the particular department. Customer (both internal and external) related problems are discussed and possible solutions are also given. The progress of small group activities and BGC projects going on in the department, Kaizen activities are also discussed.

The record of meetings [Appendix 4.7] done in a particular year is maintained and in 1995-96 the total time for which the meetings were done came to around 25% of the total man hours.

4.6.3 Need for TQM (Perception of Employees)

When asked about the need of TQM, a senior person in the personnel department told that it was stated by the head office and we simply followed it. The need

communicated was crisis and vision both. A middle manager told that initially before the TQM implementation, an employee survey was conducted by an external body in 1992-93. The survey concluded that most of the old employees are retiring and 1993 is the right time for the TQM implementation. The result of the employee satisfaction survey was 2.29/5.0. He felt that TQM is the vision of the CEO of the company. Earlier the culture was like that of a public sector company and none bothered whether you worked or not, but now the approach has changed and you can be caught for indiscipline. The assistant superintendent of the casting and carbon plant felt that the need of TQM was probably because of the adverse market situation and vision to go global. A supervisor in casting section told that TQM was needed because there was a crisis as we were facing stiff competition from public sector giants. When asked by one of the union officials about the need for TQM he told that while our competitors were having a profit of around 300 crores, we had profits of around 48 crores in 1995 though the turnover of all was same. A worker told that the reason for the need of TQM was competition and quality as told to them by the senior persons. He accepted that the workers believed what was conveyed to them by the senior persons.

4.6.4 Organisation Goals

There are mission and vision statements for the whole plant. However for each department there are only mission statements. From November 1995, INDAL began a system, through which the path to achieve the goals of the company were built into a network of approaches and sub approaches which gave every employee a role in achieving those goals, thus strengthening involvement and accountability [Appendix 4.8].

When asked about the formation of the goals the TQM co-ordinator told, "The company goals are made by the corporate head office. The objectives of the plant are set accordingly by mutual discussions between the heads of the various department. For the workers, the objectives and targets are set in the agreement. For staff above foreman, objectives are set by the concerned authorities. The annual plans were made earlier also but the communication of these goals to the lower levels was less. Hardly 5-10% of the employees (workers) knew about it. But now 70-80 % of the employees know about it. Earlier the operation of this smelter was not full due to the lack of

power. But due to the addition of captive power plant the power problem has been eliminated and we were able to increase the capacity utilisation from 20% to 80%". When asked about the formation of plant goals, mission, vision statements etc. the Works manager answered, "For forming the goals, vision and mission statements of the plant persons from the corporate head office were involved. I was also involved in those activities. The approximate figures of PAT, PBIT, PBT etc. were taken care of and based on those figures, goals were formulated. Later these goals were delivered to the departments through interdepartmental meetings. Then by using matrix approaches [Appendix 4.8], we made departmental goals".

The assistant superintendent of the casting and carbon plant felt the earlier the company did not think of strategic planning due to monopoly in the market and was able to survive but now it is planning strategically as the competition has increased. He elaborated that the company has planned what it will be after 10-20 years. A middle manager in the pot room told that on 29th of each month, the required calculations for the next month based on the data of previous month as power availability, capacity, pot availability etc. are done. Based on the plant target, the department goals are made in consultation with the departmental head and the Works manager. A middle manager in the personnel department told, "To formulate the vision, and mission statements, a 3 day workshop was conducted by the "Eicher Consultancy Services". The persons involved were assistant superintendent and above. From the company goals and mission statements given by the head office, department purpose analysis was done and accordingly each department's mission statement were made. There are no vision statements for the departments". A supervisor in the casting section was unable to tell about the long term goals of the plant.

The Quality policy statement, company goals, vision and mission statements were formed to embed the quality culture in the organization. The quality policy statement, company goals, vision statement and mission statement are shown in the next page.

The specifics of the Quality policy are :

- ### GOALS TO BE REACHED BY 2000 AD BY INDAL

- ### VISION STATEMENT

We INDAL

By giving best value for money to customers

In Our chosen business

Shall Make INDAL

a leading company in India in

- * Profitability
- * Growth
- * Export
- * Employee and community well being
- * Ethics

ENEMIES SEEN BY INDAL

“Cynicism”

“ Suspicion ”

“Lip Service”

“ Selfishness ”

“ Low professionalism ” - Low skills - Not on shop floor

- Buck passing

- Unsystematic

“ Defeatism ”

“ Fear ”

Mission statement of R&D section

R&D- INDAL Hirakud will render reliable technical services to internal and external customers for upgrading quality of products and processes.

- We will continue to be environment friendly by continuous monitoring, co-ordinating with other departments, on control measures and liaising with statutory authorities.
- We will effectively adopt MIS to achieve our goal.
- This will be achieved through technical competence, team work, and appropriate sophisticated instrument and accessories.

4.6.5 Improvements Due to TQM (Perception of employees)

The TQM co-ordinator felt that the viewpoint of the employees regarding quality has changed after training and now they say that quality decreases cost. He told that TQM has changed the mind set of the people, and blaming has been decreased. When asked about improvements after TQM, the maintenance superintendent replied that inter-departmental relation ship has become better, house keeping has been good, discipline has increased, meetings are done regularly, communication has improved. A middle manager in the personnel department informed that the company has been able to double its market share after TQM implementation. He felt that the weakest point of TQM was the external customer supplier relationship. When asked about worker participation, the assistant manager of carbon and casting plant felt that worker participation has increased in solving work related problems due to BGC and SGA activities like the demurrage charges of Alumina have been reduced due to employee's awareness only. A union leader felt that the communication has improved a lot, and the employees have become conscious about their performance, quality of product, competitors, production targets, etc. A worker felt that the changes after TQM are extensive training, house keeping, Kaizen activities and small group activities. He felt that TQM has really benefited them as they are getting more knowledge through training regarding their work, quality, safety etc. The production performance for the last two years is shown in Appendix 4.17.

4.6.6 QUALITY CIRCLE ACTIVITIES

4.6.6.1 Activities Before TQM

Earlier before the implementation of TQM (before 1993), there was joint relation committee which was a statutory committee of both union and management. The meetings of this committee was held every month on safety, health, production etc. Below that there was sub-committee. These committees were not effective as there were no norms and guidelines and the participation level was also very low.

Before the TQM era, there was suggestion scheme in which suggestions were invited from the workers and submitted in a suggestion box. These suggestions were read and analysed by the concerned authorities for implementation. The best suggestions were awarded in cash. The implementation efficiency in suggestion schemes was very low around 3-4 / 20 as rated by a middle manager. The only positive factor in that scheme was that the employees were more involved because of the cash award. The view of the management regarding suggestion schemes was that the participants used to give unrealistic and impractical though theoretically possible (sometimes) suggestions which were, therefore, unimplementable. But some of the employees felt that they gave excellent and implementable suggestions but the management did not implement them due to unknown reasons.

4.6.6.2 Post TQM Era

The TQM programme at INDAL started with the services of "Eicher Consultancy Services" and the Quality circle activity was the first to be introduced in 1993-94. The consultancy proposed the "Small group Activity model" popularly known as "SGA" at INDAL. These are basically cross-functional voluntary activities. The main purpose of this activity was to increase employee participation in various plant related activities. Some of the SGA projects include reducing power loss in electrolysis of Alumina, changing the canteen building, improving Rolling Ingot (RI) quality, reducing oxide in metal, relocating the notice board for better light and space, reducing the paste leakage from anode pots, reducing voltage drops at the joints, accuracy of metal poured in pots, changing the dumping ground into a beautiful lawn (which is known as the "Pragati maidan") etc. The source of the idea for these projects is mostly internal and

level independent but sometimes the ideas came from the technocrats from Calcutta and Alcan also.

4.6.6.3 Becoming Globally Competitive

Besides the "Small Group Activities", INDAL-Hirakud started another QC activity popularly known as "Becoming Globally Competitive - BGC" during 1995. The reasons cited for the start of BGC activity was poor performance of SGA. However SGAs are not closed and are simultaneously going along with BGC projects but are paid less importance. A number of respondents felt that the SGAs were not as successful as expected. The involvement and participation was quite low which resulted in the poor results of SGA activities.

The BGC model was being practised by some of the INDAL plants and it was a great success in those plants. The idea was formally proposed by the head office that the particular model is currently practised at INDAL-Electronics and it has been a great success there. A senior manager told that the person behind this project at INDAL-Electronics is now shifted to the head office and he might be the mastermind for this as he was a great advocate of BGC. The BGC model was originally proposed by ANNAR consultants of USA. The BGCs were supposed to be more process oriented while the SGAs were more result oriented.

4.6.6.4 Identifying BGC Projects

The BGC projects are closely related to the company goals. There is a well defined procedure to identify and select a particular BGC project. The procedure is known as "Goal-Approach Matrix" [Appendix 4.8]. This matrix is a multi-dimensional matrix in which the plant goals are written in the rows and the processes related to them (known as IPO or improve the process) are written down in the columns. Then the process and the goals are matched and analysed which process (improvement) will affect which of the goals. This procedure is carried downward for each project and a series of matrix are identified. In this way the project are selected. After selection of a particular project the possible causes are identified, and action plans are chalked out. The process flow chart and project sheets are prepared are prepared for each project For Example in the year 1996, to achieve the company goals [Appendix 4.9], 12 approaches were

identified for which 9 sponsors were selected. From this 5 BGC projects were identified from first matrix and 27 projects were identified from the second matrix.

4.6.6.5 Team Formation

The process of making a team is also defined. Each project has a project leader and 4-8 members with 1 sponsor. The members are selected either from a single department or from various departments, depending upon the requirement of the project. The maximum team members can be kept upto 6 ± 2 . When there are compelling reasons, the members can be increased. All but one (at most 2) members must be directly involved with the process that is being improved. Each BGC project is initiated and scheduled in each quarter of the year and the duration of each project is decided before it is started. There is a set procedure to review the progress of BGC projects in WSC meetings through BGC activity status report [Appendix 4.10]. The Reviewing of BGC projects is done by the head office also. Some of the projects started during the 4th quarter of 1996 are:

- IPO Auxiliary power consumption.
- IPO Anode contact drops
- IPO RI casting
- IPO Anode paste consumption
- IPO training on job
- IPO attendance of employees etc.

4.6.6.6 Initiation of the Project

A letter is sent to the sponsor of the project asking him to initiate the project along with their team leaders. Generally the sponsor and the team leader is of the level of Assistant Superintendent and above. The issues related to the project are discussed in the DSC and then the sponsor finalises the members with the consent of the team leader

4.6.6.7 Norms of BGC Projects

The objectives of projects is to improve the process (create, define, monitor, and improve the process to get the desired results).

Role of BGC team leader

- Have regular meetings.
 - Set up the meeting place and time in advance.
 - If attendance is poor, make the sponsor know about it.
- Make and follow the agenda.
 - Keep the team focused.
 - Take up walk in items at the end.
 - Summarise action items; follow through action items at the beginning of the meeting.
- Manage the time.
 - Allocate the time for each item on the agenda.
 - Start and end on time.
- Get everyone's participation.
 - Have the right people in the team.
 - Establish ground rules.
 - Make sure that the team stays focused (follow road map).
 - Follow up action items.
- Keep the sponsor informed.

Role of sponsor

- Identify improvement opportunities.
 - Identify the processes that need improvement.
 - Identify team leaders and together with him select the team members.
 - Support the improvement effort.
 - Make sure that the team is able to meet on a regular basis.
 - Make sure that they get inter-departmental support.
 - Take timely actions on any expenses or investments that may be required (based on data / facts).
- Review the improvement efforts.
 - Make time for periodic reviews with team leaders .
 - Demand data / facts.
- Empower the team
 - Do not attend the team meetings. If interested in participating, in brainstorming sessions, attend as equal, and not as a boss.

- Accept the recommendations of the team.
- Congratulate and encourage the team if they are successful.
- Disband the team when the process improvement and documentation is complete.

4.6.6.8 Quality Circle Contests

The employees are sent outside for state and national level quality circle contests. The best projects are selected internally. A number of employees have won prizes in national and state level contests. Like two teams from INDAL won prizes in January, 1996 in a contest organised by NALCO at Bhubaneswar. In December 1996, three employees of INDAL won prizes in a national level contest organised by CII. The winners are awarded by the Works manager and a grand dinner is given to the family of the winners in the guest house in which all the senior employees are present. If any employee wins a prize in SGA competition then that prize is shared by all.

4.6.6.9 Perception of Employees

The TQM co-ordinator told that the BGCs are more focused towards quality efforts. One union official told that the BGC and SGA are not that successful as desired since self interest in the employees is lacking and hoped that they will succeed in future. He told that they have reached 60% success till now but we have to achieve 100%. A middle manager when asked about the SGA and BGC activities replied like this, "The SGA model was more goal oriented and probably this was the reason which caused its failure. The BGC model, proposed by the consultants, is more process oriented. The consultants told that INDAL being a conservative company with a old culture and ethics, needs a different approach and therefore the need was to approach the process and not the result." He told, "The commitment from the middle management has not come yet. The SGAs are too slow. The time scheduled for the SGAs was around 4 months but uptill now it has not shown any appreciating results". He felt that the whole process needs a cultural change as the BGCs are seen as a top driven activity. He also feared that changing the models of group activity so frequently may result in losing confidence of the employees.

4.6.7 Kaizen Activities

The Kaizen activities at INDAL-Hirakud started in February 1994. The Kaizen participation is a voluntary activity at Hirakud but a target is set for each department. For better co-ordination of Kaizen activities, there is a Kaizen co-ordinator who co-ordinates and reviews Kaizen activities inside the works. The best Kaizens are presented in WSC meetings. The person contributing the maximum number of Kaizens is awarded as "Kaizen Samrat or King" by the works manager and is felicitated by a "Angabastra". The employees write their Kaizens in a specific format called "Kaizen forms" [Appendix 4.11] which helps them in remembering what they suggest. The employees read their Kaizens in front of the canteen every Tuesday, which is celebrated as the *Kaizen day*. The works manager also presents and delivers his Kaizens on the *Kaizen day* along with other senior persons. The Hirakud plant completed 12,303 Kaizens (cumulative) upto October 1996. The target set for Kaizen participation for each department is 50% of the total employees.

The plant celebrated 10000 Kaizens in July 1996 and GM-TQM from the head office visited the plant. One big shopper bag with INDAL logo and "Kaizen For Improvement" was distributed to the employees as a memento. Upto November 1996 the total kaizens were 12,303 (cumulative). The month of November is celebrated as the quality month, and in that month the actual performance outstated the targets like total kaizens were 1482 with 89.3% participation as against 1000 kaizens targeted. The Kaizen status is shown in Table 4.6.7A.

Table 4.6.7A : Kaizen Status

Month	Number of Kaizens			% Participation [†]		
	1994	1995	1996	1994	1995	1996
February	18	44	42	16	47	41
March	10	42	40	7	46	40
April	17	44	38	13	47	33
May	18	41	36	15	42	33
June	22	44	32	24	47	31
July	36	41	40	39	42	40
August	34	36	50	37	33	51
Sept.	12	38	56	11	37	55
Oct.	28	40	55	28	40	53
Nov.	95	64	56	93	51	54
Dec.	44	59		44	65	

[†] % of total employees

4.6.7.1 Kaizen Appreciation Scheme

The appreciation scheme was decided in the 23rd WSC meeting. In this scheme, a lottery is drawn once in the 1st week of a quarter (3 months). The whole plant is divided into 9 zones. The eligibility for participation in the contest is that the department must have done at least 50 % Kaizen participation and during the quarter considered, each employee must register at least 1 Kaizen. The approved amount for the lottery is Rs 5000. A total of 63 lottery are drawn in one quarter which statistically comes to around 10 employees personnel lottery.

4.6.8 House Keeping

INDAL follows the 5 S concept of House Keeping. The 5S concept include:

- * Shitsuke (discipline)
- * Seiri (segregation)
- * Seiton (cleanliness)
- * Seiso (arrangement)
- * Seiketsu (maintenance).

For the co-ordination of House Keeping activities, there is a House Keeping co-ordinator. For better House Keeping, the whole plant is divided into 12 House Keeping units. These are :

Rectifier section, Carbon Plant & Raw Material, Traffic, Pot Room - 1, 2, 3, 4, 5, Civil Maintenance, Mechanical Maintenance, Mechanical Workshop, Electrical Distribution, Casting Plant, General Store, Scrubber, Canteen, Personnel Department, A/c + Typing + Cash Office, Purchase + Scrap Yard, R&D, D&P.

The House Keeping activity is reviewed by an internal audit team. The audit team comprises of members from the plant and are trained in the auditing. The audit is done every month in each unit. The winner of the House Keeping audit gets a running shield for that month which is kept in that unit. For the audit purpose, certain norms are made which are same for all the units and these norms are given a set of points [See Appendix 4.3]. The ranking of attributes (in the norms) is done on a scale of 1-5. In the audit of November 1996 the R&D section got highest score in the audit with D&P

following it. The points given in House Keeping Audit for positioning of items and cleanliness are shown in Appendix 4.3.

4.7 ORGANISATION STRUCTURE

The organisation structure of INDAL-Hirakud is shown in Figure 1. The different employees levels are described in section 4.5 and shown in Appendix 4.5.

4.7.1 Changes in Organisation Structure After TQM

The personnel superintendent and the assistant superintendent of the "Casting and Carbon plant" told that there has been no change in the organisation structure due to TQM related activities. When the personnel superintendent was asked whether some study was conducted to know that the structure was sufficient, he replied that a long debate was done on this issue in WSC meetings and views of experts from outside were also taken and the structure was found sufficient. The Works manager also told that there has been no change in the organisation structure but he informed that there were no discussions regarding this. Almost all the other respondents had similar views on this issue. Almost all the employees from all levels felt that communication has improved after TQM and openness has increased..

4.7.2 Decentralisation and Delegation of Authority

The TQM co-ordinator replied that there is no change in decentralisation as it was already there. But he informed that safety, training, etc. which were the responsibilities of the personnel department earlier, are now the responsibilities of the various line departments. Like the safety officer, though under the personnel superintendent, directly reports to the works manager. He also told that job delegation has increased. He informed, "The manager production is made the in-charge of the strategic planning by the corporate office and he is generally busy with the head office. He is also looking after the production job. But he has delegated his authority to his sub-ordinates". But he was unable to say whether these changes can be attributed to TQM. A middle manager when asked about delegation of authority felt that upto the supervisor level there is practically no change but many things have really gone to the lower level like fixing problems, giving suggestions to their seniors regarding their work, safety

consciousness etc. A middle manager in the personnel department told that some decentralisation has been done as in the case of training, which is now the responsibility of the different departments. But he told that the personnel department still has to take initiatives for training as the mind-set has not yet changed.

4.7.3 Changes in Responsibilities

A middle manager in the pot room told, "Earlier the responsibilities were not clearly defined and in case of some fault, blaming was the easiest escape. But after documentation the responsibilities are very clearly defined and one can not escape and he has to give reasons for that.". Another manager felt that in some areas, they were burdened with extra responsibilities of more Kaizen participation as the activities were not up to the expectations. A supervisor in the casting section felt that there has been no change in the responsibilities but only documentation has been done as a result of ISO, and because of this, the responsibilities have become clearer. The Works Manager felt that the responsibilities have increased and told, "For example in 1993, we went for expansion and we increased the production capacity of the plant. This required more work force but we managed it with the existing work force by giving extra responsibilities. One of the union leaders felt that the work and responsibilities have decreased as the work has become more systematic and now they clearly know what they are required to do. Another union leader told, "After TQM implementation our job responsibilities have increased as we have to give Kaizens, do house keeping, maintain cost, reduce wastage etc. and this is something extra to our normal work". He told that this is transition phase as most of the old employees are retiring in 2-3 years and new employees are joining. This is a positive factor as new employee will easily adapt the new system.

4.7.4 Empowerment

When asked about changes in empowerment the House Keeping co-ordinator told that empowerment was already there. He quoted, "Once I was hosting an IAS officer and he was staying in the Guest house. During the night, he asked me to arrange for an STD call. There is an STD connection in the guest house but normally that is for official use only. Since he was in urgent need of the call, I arranged for the call though

I was not authorised to do that. No one asked me why it was done". The personnel manager told that earlier to pass a bill, the security officer had to go to different persons and a lot of time was wasted in the process and so the whole process was eliminated and he was authorised to take the decision. The supervisors when asked about empowerment told that there is less scope for them to empower employees due to the nature of job (routine). They felt that there are practically no changes in empowerment. The operatives also told that there are no changes in empowerment. They informed that empowerment is difficult due to the nature of the job but they have full freedom in their area of work.

4.8 COMMITMENT AND INVOLVEMENT

4.8.1 Perception of Management

The HK co-ordinator told that full support is provided to implement the suggestions but those suggestions which need high investment are not implemented directly but are implemented only after discussion. He told that if the Works manager comes to know about any suggestion that should have been implemented but has not been implemented, he gets wild. When asked about commitment the Works Manager replied, "We are able to generate initial commitment but we are not able to sustain it. It is felt as a top driven process and not bottom up and employees are not willing to do on their own. The new generation of employees is a facilitating factor in this regard. Earlier we were able to reduce the anode drop drastically and it was a record for us but we were not able to sustain it". He told that he and other senior managers eat lunch in the mess with other employees but some managers resist to mix with employees. He also told that since the starting of TQM programme they are able to organise WSC meetings continuously every month but the union participation is somewhat reducing. A middle manager in the pot room told that the management is not fully committed and level of commitment is around 60% due to information sharing and mixing with workers. The TQM co-ordinator felt that the management has tried to show visible commitment by floor walking. The assistant superintendent of the casting and carbon plant told that he has set a precedent of leaving no work pending and his subordinates realise and follow this. The assistant manager of carbon and casting plant gave an example of workers suggesting their seniors when the screen in a machine was slightly

damaged and inspite of the fact that it could have been used for some more time, due to safety reasons the workers suggested him to replace it immediately.

4.8.2 Perception of union

A union leader told that the management gives full technical and infrastructural support in the projects of SGA/BGC implementation.. He told that once they proposed a boundary wall for the worker's colony and the decision required investment. Though the final decision took around 1 year to come, it has been finally implemented. In another example he quoted, " We are having frequent power cuts for 2 hours each day in the evening. Our children are having difficulties in study. We have conveyed this problem to the management to give us power from the Hirakud power in the worker's colony but up till now no decision has been taken.". One of the union official told, "Earlier in the canteen the food was served by the waiters but after TQM implementation, self service system has started and now every employee has to take food himself whether he may be a manager or a worker. There is 15- 20 minutes lecture by the Works manager every Wednesday, on 5S concept and he has not yet missed a single lecture.". A union official told , " Earlier the meal was on cost (around 37 paise) and quality of the food was also bad but now meal has been made free and quality of the food has also been improved". One of the union officials, when asked about this, he told that

- Pocket checking of all employees from management to workers has been introduced. Earlier only the workers were checked and the managers were not checked.
- There was a separation in the canteen by a wall and the managers and the workers ate separately but now that wall has been broken (in 1994) and every employee sit and eat in the same hall. However when it was cross checked with some other employees it was found that the managers and employees sit in different groups.
- The management once gave 1 month salary payment in lieu of profit and it was not mentioned in the agreement.

4.8.3 Perception of Lower Staff

A supervisor in casting section informed that once there was a monetary crisis, then the senior management reduced their pay packages. Another supervisor told that once during house keeping activities inside the works, the Works manager himself cleaned the floor which inspired the employees very much.. One worker told that earlier they were having very less information about the profits, cost of our products vis - vis our competitors, and other activities, but after TQM they are having enough information as the communication has become transparent. One worker told that the Works manager daily asks about the problems in the morning and takes the round of the whole plant.

4.8.4 Community Development

- Plantation in the neighbouring areas through BGC projects.
- Donation of scientific equipment, furniture etc. to the local schools.
- Sponsoring the candidates for advance diploma courses as part of commitment to enhance employability by providing them on some value addition trades.
- A Vermiplast unit in collaboration with the Sambalpur university for eco-friendly bio degradable garbage disposal system to avoid pollution.

4.9 INDUSTRIAL RELATIONS

4.9.1 History and Background

There are two unions at INDAL Hirakud. One union, known as "Employee's union" is since inception of the plant and is the oldest union. It was registered on 9th December, 1959 and is recognised by the All India Trade union Congress (AITUC). In 1972 and in 1978, rival unions emerged due to internal conflicts, but were later merged. Recently in 1991, another union known as "Majdoor Union" or "Worker's union" evolved as a result of leadership issues among the employees. This union is affiliated with the "Hind Majdoor Sabha" which is a national level body (came up in 1986), with the support of "Janta Dal". The "Worker's union" was in power after winning the general elections in 1992-93 and it was the first time when any other union other than the "Employee's union" was in power. Both the unions, operating at INDAL-Hirakud have external

leadership but there are internal leaders also from among the employees. The leaders of both the unions are from all age groups, but the key posts are held by older employees.

4.9.2 Elections and Agreement

The election is done two times in every 3 years by secret ballot under the supervision of the Government of Orissa. The term of office is 3 years, but after 2 years mid-term elections are conducted to test the majority. The "Worker's union" lost these elections by a very small margin in the mid-term elections in 1995-96. The management recognises only one union, whosoever is in majority and does the agreement with it. The change in jobs, equipment, methods, work reorganisation, recurring new jobs are done according to the long term settlement. For example in the 8th long term settlement around 162 new jobs were created and the productivity target was increased from 28 tons/10 men to 32 tons/10 men.

4.9.3 Industrial Unrest Problems

There are very few cases of industrial unrest in the history of INDAL-Hirakud. The older employees only remember that there was a strike in 1970, when there was a lockout for around 3 months. After that there has not been a single strike here. Sometimes, there are problems at the department level when shutdowns for small periods (for 1 hour etc.) are called but these are infrequent. One of the union leaders who had joined the organisation in 1964, and joined the union in 1965 told that in the lockout of 1970, which lasted for about 3 months, the management succeeded but all the men, who were fired were taken back by the President's approval and there was no pay cut for the lock out period. The Hirakud plant also achieved the national award for cordial management-union relationship by the then president of India.

4.9.4 Perception of Different Levels

When the Works manager was asked about the support of the union in TQM implementation, he told that they are not that much supportive as they should be. He elaborated that some of the union officials feel that the management is interfering in their matters when they try to discuss with the employees about their problems and so they try to avoid TQM activities. On the other hand, he felt that the same problem also

lies with some of the managers as they do not want to share information with the employees.

The TQM co-ordinator when asked about the role of union in TQM implementation replied, "The role of the union was very vital and TQM implementation would have otherwise been impossible without their support. In WSC meetings the union officials play a vital role in discussing crucial matters. Their attitude is fully supportive".

The personnel superintendent told that their role has been very positive till now as compared to the other units in the eastern part of Orissa. When asked about unrest inside the works he replied that sometimes there is unrest for 2-3 days but this behaviour is "just like an annoyed child asking his father not to take food and so things settle down easily".

The assistant personnel superintendent told, "In the year 1993, which was the starting time of TQM implementation and also the time when a new union was in power, things could have been difficult for TQM implementation but the attitude of the new union was overwhelming. In fact, it was a very strong supporter and advocate of TQM activities. But after 2 years in the mid term elections, when it was in minority (though by a small margin) it tried to cause disturbance in smooth running of the works by asking the workers for shutdowns and challenging the validity of elections. It also started using TQM activities as a tool to threaten management like asking workers not to give Kaizens and not to attend training sessions for their demands".

One of the departmental heads told that the union creates problems in cases of grievances. He felt that attitude change has really not taken place here, but the union has given their full support in WSC meetings and group activities. He also felt that earlier there was lot of gundaism in the locality as there is only one industry and so the whole mass is interested in it, therefore they are sometimes unable to take bold decisions against miscreants.

One union leader when asked about the relationship between the management and the union replied, "We are like family members here and the relationship has improved after TQM implementation as the communication has improved between us."

Another leader told that the external leaders sometime ask for unnecessary strikes to get personal favours from the management but the internal leaders (including him) try to stop such strikes.

One old worker (probably the oldest as stated by him) told that the present union (Employee's union) is not at all helpful to the workers. He elaborated, "The union leaders and some of the managers have become cheats. The worker's union is somewhat better than the employee's union. The previous union leaders were open and did not keep anything secret. But this union does everything on its own without any consultation. The leaders of worker's union are bold and their agreement was far better than the present agreement in terms of monetary benefits". He also told that the leader of the worker's union was killed outside the works by some external elements. When asked if the worker's union was better then why did it lose the elections, then he told that the employee's union used bad tactics and threatened the employees to vote for them as it has a strong presence in the locality. He also praised the Works manager for his kindful acts. He informed that in the history of Hirakud plant, no Oriya person (The present one is Oriya) has gone to the top. Quoting an incident he said, "In the past some of the workers were not getting increments for about 3-5 years and our financial conditions was getting worsened. I went from top to the bottom but no one paid heed. Then I requested the Works manager and finally got the increments". He also informed that the young supervisors and managers can not take any disciplinary action against the employees as they threaten them.

Another old worker told that once he was ill for about a week and the shopping bags were distributed in between. He was unable to procure the bag after joining inspite of several requests to the concerned authorities. Whereas one young employee, who was also on leave at the time of distribution scolded and threatened the authority in-charge and he was immediately given the bag.

Another young worker whose father was also an employee of the same plant, was quite unhappy and annoyed about union's (present) and management's attitude. He informed, "The union leaders (of Employee's union) are cheat and corrupt. They are being bribed by the management in the form of money and employment to peers. They do what the management asks them. We are trapped between the union and the management". He quoted several differences which the management makes with the workers. He said that though there is a community centre for the workers but for the management staff there is a club and the workers are not allowed to go to the club. He further told that there are very few facilities in the community centre as compared to

the club. He was bold enough to say that he has several complaints against him as he never gives Kaizens etc. He told, "The TQM activities are definitely good for the health of the organisation but the senior persons never practice those activities what they ask us to follow. They are only rhetoric. The senior persons always discriminate between the management and the workers".

4.10 TRAINING ACTIVITIES

4.10.1 Changes after TQM Implementation

Before ISO and TQM implementation, there was no formal training procedure and no training records were maintained. The training programmes were made annually and the number of training given to employees was also very less. There was no formal procedure for identification of training needs of the employees and they were randomly selected for training. However after TQM implementation, in September 1993, the training procedure for each department was made. The whole process was documented as it was also a requirement under ISO. It was made mandatory to keep monthly records. The yearly planning was broken down to monthly planning.

Annual training plans are prepared by each department during the month of March and the personnel department compiles the annual training plan for the plant. The training target for the whole plant is set in terms of training man hours per employee by the personnel department in consultation with the departmental and union heads and is different for operatives, staff and senior management. Training need identification form is sent along with training card (showing training done by participants) to each department. Each month, a training calendar and weekly training schedules are prepared by the personnel department depending upon the shift of employees and the venue. The concerned departments and the persons are then informed about the details of the training schedule. In each training session the personnel department is the co-ordinator and makes necessary arrangements for venue, tea and snacks etc. Each training session is initiated by the Works manager so that employees are motivated to attend the training sessions. The attendance of each training session is maintained. If any employee does not turn up in a training programme, then a disciplinary action of refusal of order is taken against him if there are no other compelling reasons. A middle manager concerned with the training activities told that there is no problem of

absenteeism in the training sessions till now. The achievement level of the targets is reviewed in monthly Works Steering Committee meetings. The combined effects of "on the job" and "off the job" training is monitored through training reviews during February every year. For the year 1996, the per capita training man days target was 3.5 man days (MD) and 2656.5 MD in a year. The actual achieved was 0.53 MD per capita with average of 407.5 MD in the year 1996. In 1995-96 the target for training was 4 man days in a year. For operatives the training target was 0.25, for staff 0.5, for Senior staff 0.5 man days in a year. The training status is shown in Appendix 4.13.

4.10.2 Areas of Training

The types of training is divided into :

- Off the job training.
 - External Training (outside location)
(Feedback in a structured format.)
 - In-house Training (By an outsider in the works).
(Short feedback, if required)
 - Internal Training (A quiz is conducted at the end of the session.
Score is recorded if required).
- On the job training.

The areas of training are very vast. These include skill development programme which is generally for the operatives to improve their skills at work. Other areas of training include ISO refreshers, SPC, SQC, fundamentals of electronics, safety, sanitation, health, security, environment, maintenance, disaster management, shop floor management, hazard control, flow charts, E- mail etc.

4.10.3 Infrastructure for Training

There are three conference rooms totally devoted for training activities in the plant. There is provision of tea, snacks etc. In the training sessions. If any employee is attending the training programme other than his regular shift hours then he is paid for it. However if any employee is attending training during his working hours, he finds it interesting, for obvious reasons. The faculty for the internal training is sometimes the senior persons from the plant itself who are given external training in those areas.

Training faculties for the senior management is normally external. The assistant superintendent of the "casting and carbon plant" told that he had attended 6-7 training programmes conducted by the "Eicher Consultancy Services" and had delivered around 12-13 training classes at the department and the plant level. He also told that the training needs of self are decided by themselves but for the lower level there is training need matrix on the basis of which the training needs are decided. A union leader felt that more training is needed for the lower staff. The union leader had himself attended around 4 outside training courses in the areas of ISO, management-union relationship etc.

4.10.4 Training Procedure

The purpose of training procedure is to ensure smooth conduct of training at Hirakud. The scope of training applies to all employees involved in all activities affecting quality of products at Hirakud. The responsibility lies with the Head of Personnel Department.

Procedure of training activities :

- 1) Identification of training needs by the department head concerned.
- 2) Preparation of departmental annual training programme by the department head.
- 3) Preparation of plant annual training plan by the Section head (SH)(HRD)
- 4) Identify that the training programme can be conducted in-house or not.
- 5) The arrangement of external training is done by the Departmental Head and section head (HRD).

4.10.5 Identification of training needs

The procedure for identifying the training needs is different for different levels. For the operatives the individual needs are identified by the foreman in a specific format. The Generic needs are finalised by the Personnel department in consultation with all other departments. The specific needs are finalised by the Section head or the Divisional Head. The workers are generally given in-house training in groups and in general areas related to their work. In each department a training matrix is prepared in which the training attended and training needed by the employees are maintained. For the junior staff, the training needs are identified by the personnel department in consultation with

all departments. The weak areas of a particular employee are suggested by the plant head based on his performance. For the middle management and the top management, the source of training need is performance appraisal. For top management the training needs are either identified by their senior or the person is asked by his senior and he himself identifies his area.

Table 4.10A : Identification of Training Needs

Class	Description	Responsibility
Senior management Staff	Superintendent and managers	Works Manager
Middle Management	Assistant Superintendent and General foreman	Dept. Head concerned/ Works manager
Junior Staff	All staff up to foreman	SH / DH

4.11 PERFORMANCE APPRAISAL

For the supervisors, the section incharge generally sends the performance report to personnel department. The minimum period for a promotion is 2 years. One of the union official told that if the performance is too bad then the increments are stopped but this is rare. There is stagnancy allowance also, for example if any employee is in a grade for 10 years he gets 1 increment. The assistant superintendent of the “casting and carbon plant” when asked about performance appraisal told, “The performance appraisal system has changed after TQM implementation. The procedure has become more formalised and frequency of appraisal has also been increased to twice in a year. The performance objectives are fixed every year in the starting and displayed on the boards. There is an appraisal form for both the appraiser and the appraisee”.

4.11.1 Perception of Management

The TQM co-ordinator told, “The appraisal system for operatives has not changed and we are still following the old system. For the senior persons there is self appraisal scheme. For the staff, since the objectives involve quality therefore quality automatically is included in performance appraisal. This system was there earlier also but it was not established but now we are sticking to it”. The HK co-ordinator told

that as there is no time bar promotion and so there is some heart burning in some employees. He added that good performers are put in some extra grades which are called "personal grades" if there is no vacancy. The personnel manager replied, "The performance appraisal method has become more open for the supervisor level and above now. The appraisal (both verbal and written) is done in presence of a third person of the level of the appraiser. The appraised person signs only when he is satisfied. If he is not satisfied then he can question and discuss about it". A middle manager felt that the appraisal should be done outside the plant, say in home in an informal manner. He informed that the rule of the presence of the third person is not always followed.

4.11.2 Perception of Lower Staff

A supervisor in casting section told that the promotions are generally based on the performance and vacancy. He elaborated that in promotions, the qualities seen are behaviour of the employee towards his senior, job knowledge, dependability, sincerity, etc. One worker felt that the management has the full role in giving promotions. One worker in the pot room told that the quality of job is taken care of in promotions, like drop level is the performance measure in rod rising operation for every batch in the pot room. A worker told that sometimes if any person has good terms with the union leaders, then he may get promotion inspite of the fact that he is not capable and we can not question that.

4.11.3 Perception of Union

A union leader told that the performance appraisal above supervisors is open but for the workers it is not, and the workers can not ask the appraiser about his appraisal. He told, "Firing is normally not done. The management tries to improve the particular employee several times and if then also the situation does not improve, he is fired. But in some cases like thefts etc., the firing is done without any warning". Another union leader told, "The performance appraisal of the workers is not open. We can ask the management to give, say 5 promotions in a plant but we can not say which of the employees will get it. This is bad and we want transparency in it". Another union

leader replied that the inter-departmental transfer is based on the vacancies and the performance of the employee.

4.12 SUPPLIER INFORMATION

The major raw material for Aluminium i.e. Alumina is planned and shipped by the corporate planning office from Muri or the Belgaon plant. The major raw materials for carbon paste are calcinated petroleum coke, pitch, cryolite, Aluminium fluoride, and calcium fluoride. The major suppliers for the raw materials for the Carbon paste are : PCC, Vizag steel, Rourkela Steel Plant, Bhilai Steel Plant, Zenith Carbon, Indian Oil Corporation, Haldia Refinery etc. The imports supplies (for example calcined petroleum coke from China, Indonesia etc.) are generally handled by the corporate head office.

The list of supplier items at Hirakud mainly consist of engineering items from oil, machine parts, Cl_2 gas, paints , greases, pumps, motors, valves, and spare parts. The total supplier items at Hirakud are around 8000 out of which critical item list contains around 300 items and each has around 3 to 5 suppliers. Around 95% of the critical items are multiple sourced. Some of the normal items are dealt by the concerned department directly. After ISO implementation, in some critical items, requirement of a test certificate is made mandatory as in case of wire used in pressure lines.

4.12.1 Inspection of Materials

Regarding Quality control and inspection of items, most of the items are regularly checked by the concerned departments and the R&D department. In some items, usual checking is done as in case of fabricating items. The materials department sometimes makes surprise test visits to see the actual conditions of manufacturing facilities, plant location and other related activities of vendors. This was done because in the past there were some fake vendors which were having no manufacturing facility but were merely trading. This was done after ISO.

For each supplier, annual contracts are made. In case of dealing a new supplier, if found suitable, generally credit payment (of 30 days) is done. In other cases payment is done as per the requirement. Sometime the payment is done through the bank.

4.12.2 Sourcing

Single Suppliers

The reasons cited for having single suppliers were :

- The item was a proprietary one.
- Because of Quality.
- In case of spare parts of machines, manufactured by a particular company.

When asked to rate the single suppliers about their performance, a middle manager in materials department rated it 8 on a scale of 10. For single suppliers the price is fixed by bargaining or asking for rebate or discount etc.

Multiple Suppliers

In case of multiple supplier items, the supplier with the lowest bid is selected if there are no other reasons. But if certain other reasons exist as urgent delivery, inability of one supplier to fulfil the demand then other suppliers are contacted.

Some of the vendors at INDAL-Hirakud are regarded as "Historical Vendors" which have been their vendors since last 15-20 years (like Zeolite Engineering, United Industrial Enterprise, Sundaram Traders etc.).

When a middle manager was asked to give a live example of any problem with the suppliers, that has been solved by mutual discussions he quoted, "In 1994 we had problems with the filter cloth which is used for filtering molten Aluminium. There was a single supplier for this item and so there was no other option to buy from other supplier. The cloth could have been imported but in that case the cost would have been too high. The supplier was contacted and the problem was conveyed to him. The problem and manufacturing process was thoroughly analysed and discussed. It was ultimately found out that the supplier used starch to ease weaving which hampered filtering. The supplier was then asked to change the manufacturing process and the problem was solved." A middle manager in the pot room told, "The location of the plant is a major constraint in maintaining single supplier relationship as due to remote location of the plant, the supply may hamper anytime and therefore to play safe we have kept multiple suppliers. Another reason is that we are still thinking that we are customers in a sellers market which is not true."

4.12.3 Selection of New Supplier

Earlier before ISO and TQM activities, there was no formal procedure to select a new supplier and the suppliers were selected in a random manner. But after TQM activities, before selecting a new supplier some checking is done. These activities include :

- Vendor Enlistment Questionnaire to be filled by the vendor and rated by the purchase section.

The purpose of the questionnaire is to know the following information about the supplier :

- Type of Company (SSI/medium/large).
- Type of Contractor.
- Whether enlisted with any other INDAL's plant.
- Technical and quality aspects.
- Manufacturing facilities.
- Products certified by ISI or other national / international agencies .
- ISO certification for the line of products being supplied.
- Organisation structure of the firm clearly showing reporting relationships of the Quality control department and qualification of persons involved.
- Inspecting , measuring and testing facilities.
- System of calibration.
- Technical collaborators.
- Sister concerns.
- Banker's name.
- Any previous history of black-listing with any company.

4.12.4 Vendor Development Programme

The Vendor Development Programme at INDAL-Hirakud has not flourished. The vendors are helped only in the technical areas when such help is desired by them. When asked by a Senior manager about the vendor development, he accepted that this has been done only for the sake of ISO certification as it is a requirement under ISO. He told that the Vendor development programme at INDAL-Hirakud is negligible as compared to other companies (like Telco, Maruti, Tisco etc.) where they have visited.

4.12.5 Vendor rating system

Vendor rating is usually done nearly after every purchase at Hirakud. But this has been possible only after ISO implementation. The rating system is very simple and only two factors are used to calculate the performance of the supplier.

These two factors are :

$$1) \text{ Quality index} = \frac{\text{Quantity supplied} - \text{quantity rejected}}{\text{Total quantity of scheduled delivery}} * 60$$

$$2) \text{ Delivery Index} = \frac{\text{Delivery point}}{10} * 40$$

10

The quality index is given 60% weightage while remaining 40% is given to the delivery index. There is no such provision to give performance certificates to the vendors who perform better.

A middle manager in personnel department told, "The attitude of the purchase section is very bad and they are not supporting whole heartedly. They never clear non conforming reports (NCR) in time which are required in audits. Every time this issue is discussed in WSC meetings but they never pay heed to it. The only things done in the purchase department is only for the ISO purpose and customer-supplier relationship can be considered as the weakest point of the TQM". A middle manager in the purchase section told, "Inventory planning is not done regularly here. The levels of economic order quantity were made 4-5 years back. Since the plant was not running in its full capacity it went well. These levels are still in use. As the plant started its full operation some problems began to arise and the levels were updated but there is no set procedure for that. The performance of material department is shown in Table 4.12A

Table 4.12A : Performance of Materials Department

Stores Inventory				
Year	1993	1994	1995	1996
Rs (millions)	9.036	9.32	11.24	13.4
Demurrage Rates of Alumina				
Year	1993	1994	1995	1996
Rs/ Metric Ton	146	65	45	72
Total tonnage of Alumina				
Year	1993	1994	1995	1996
Tonnage (Alumina)	44.75	35.2	36	19.9

4.13 CUSTOMER INFORMATION

The products manufactured at INDAL-Hirakud are Aluminium in the form of rolling ingots and carbon paste. The customer for Aluminium is its sister plants (sheet plants) at Belur in West Bengal and Taloja in Maharashtra. But due to higher transportation cost, mostly the whole of the aluminium (around 95%) manufactured at Hirakud smelter is shipped to Belur. The quantity to be shipped is decided at the head office and then annual contracts are made between Hirakud and Belur. However there is no obligation or pressure from the head office for the Belur plant to take supplies from Hirakud smelter. The Belur plant purchases Aluminium from other sources also, other than its sister concerns. This is primarily because of higher Aluminium requirements of Belur, than the production capacity of Hirakud smelter. Sometimes Aluminium is also purchased by BALCO and HINDALCO in small quantities but it is occasional. For carbon products the customers are Ferro Alloys companies like Ispat Alloys, Bhutan Ferro Alloys, Ferro Alloys Corporation, Hindustan Copper, Jindal Strips, TISCO, Universal Ferro Alloys. INDAL-Smelting used to be the monarch in carbon products 10-15 years back but there is stiff competition in this field. But INDAL is able to maintain its market share due to the quality of its products. IMFA (Indian Metal Ferro Alloys), a customer for carbon paste, awarded a prestigious "Gold Card" award to the INDAL-Hirakud for creditability and quality.

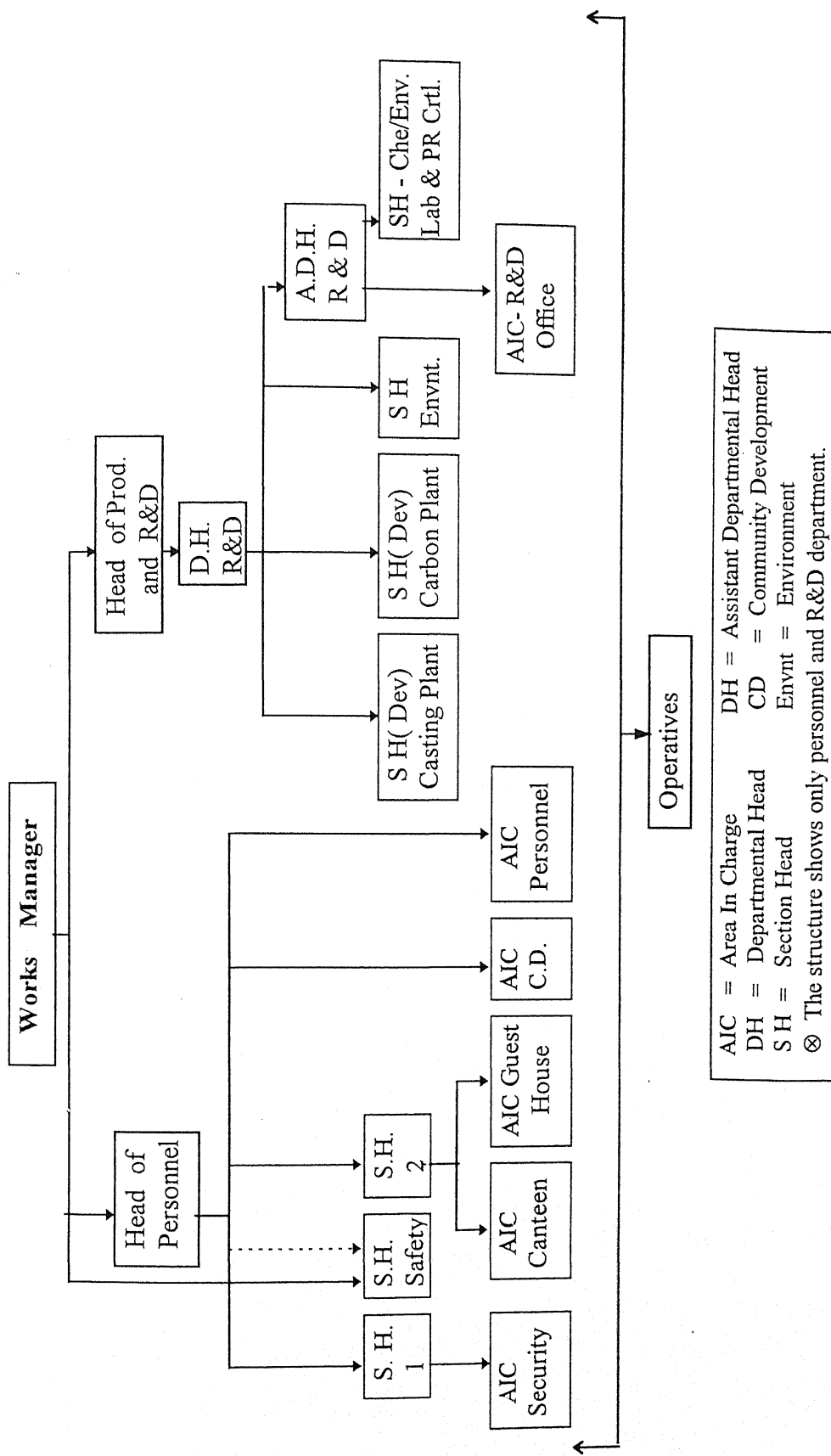
The major problems which the customers complain in Aluminium Ingots are of blisters, slivers, ruptures, crocodiles, crushing strength, hydrogen content, crystal size, improper degassing, and H_2 absorption. In carbon products, the characteristics desired by the customers are ash content, plasticity, apparent density, homogeneity moisture content etc. Regarding the problems with the customers, the rejections in case of carbon products were higher around 12% in the last financial year as compared to around 0.6% rejection in Aluminium ingots. A middle manager in the R&D section told that though Belur is their internal customer but most of the complaints are heard from Belur only now. From other customers there are very few complaints. He also told QFD (Quality Function Deployment) is being started to change customer requirements into final products.

The customer-suppliers meets, are organised at Hirakud once in a year in the month of November which is also celebrated as the quality month. The problems of quality.

delivery time and other concerned issues are discussed in such meets. A middle manager in the purchase section told, "The frequency of customer-supplier meets was very low and informal before ISO implementation but after ISO implementation such meets have been much formalised but these are not regular".

4.13.1 Responsibility and Authority of Monitoring and Reviewing Quality of Materials

The responsibility of monitoring and reviewing the quality of raw materials, products and processes in pot rooms, carbon plant, and carbon lies with the assistant departmental head of R&D section.. He is also responsible for investigating customer complaints relating to quality, review and implement preventive and corrective actions, cost of quality, monitoring and reviewing the process and inspection parameters. A middle manager told that after TQM implementation, the response to the customer complaints has become fast. The section head of Development is responsible for identifying the non conforming products and suggest remedial measures. He is authorised to suggest measures for process improvisation in production centres. For ensuring quality of products Quality policy deployment(QPD) [Appendix 4.14] charts are used. From the quality goals, approaches and sub approaches are formed .



AIC = Area In Charge DH = Assistant Departmental Head
 DH = Departmental Head CD = Community Development
 S H = Section Head Envnt = Environment
 ⊗ The structure shows only personnel and R&D department.

FIGURE 1 : Organization Structure[®] At INDAL-Hirakud

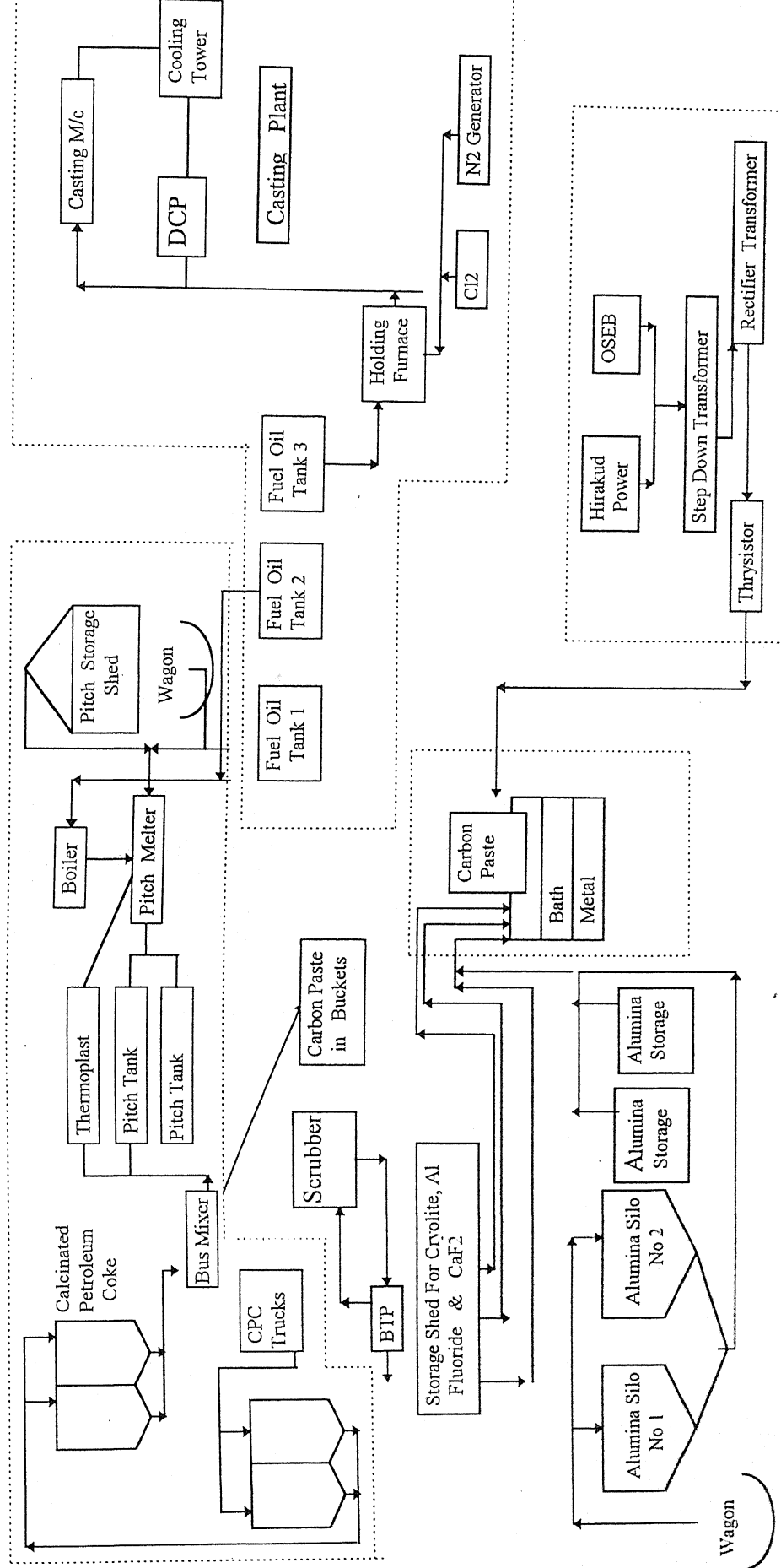


FIGURE 2 : Process Chart At INDAL - Hirakud

APPENDIX

4.1 : Location of Different Plants of INDAL

- i) Bauxite mines at Lohardagar in Bihar and Chandgad in Maharashtra
- ii) Alumina Plants at Belgaum in Karnataka and Muri in Bihar.
- iii) Aluminium Smelters at Hirakud in Orissa, Belgaum in Karnataka and Alupuram in Kerela.
- iv) Fabricating plants at Belur, Taloja, Kalwa and Alupuram.
- v) Sales and administrative offices at Banglore, Bombay, Calcutta and New Delhi.
- vi) Company Head Quarters at Calcutta.

4.2 : Subsidiary Companies of INDAL

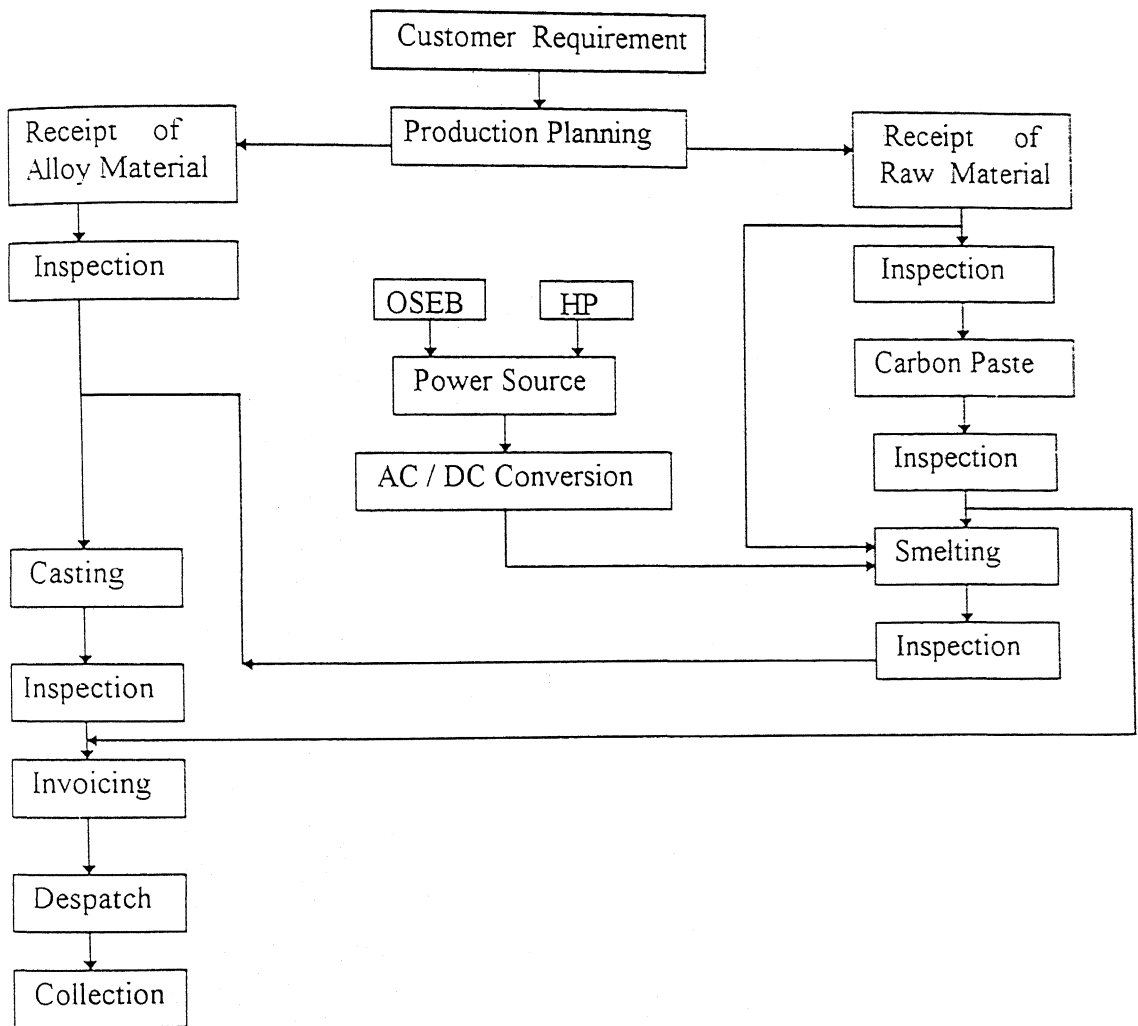
1. Indal Exports - W Bengal,
2. Orissa Extrusions Limited - Orissa,
3. International Advanced process technologies Limited - Karnataka,
4. Utkal Aluminium International Limited - Orissa.

4.3: Points given in the House Keeping Audit for Positioning and Cleanliness

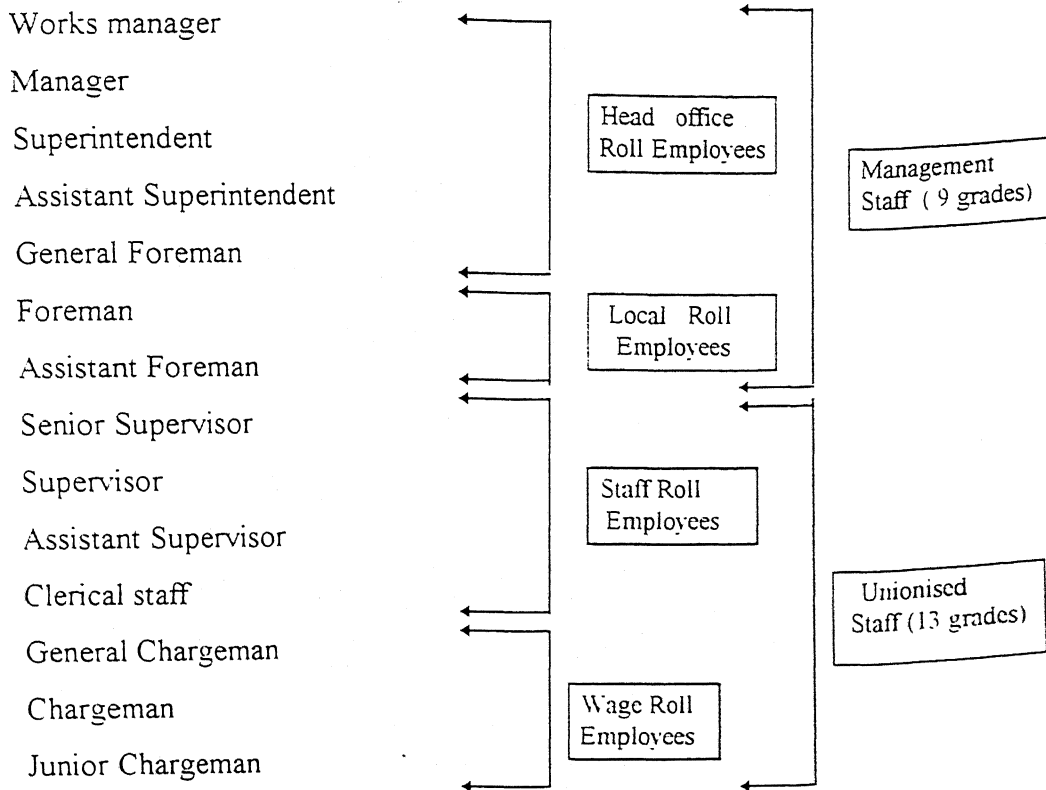
Positioning	
Attributes	Points
Table	4
Chair	5
Sidewall	4
Fan	4
Board	5
Projector	5
Writing-pad	4
Pen	4
Clock	3
Chalks	4
Light-shed	5

Cleanliness	
Attributes	Points
TV/VCP	3
A/C	4
Doors	2
Floor	4
Photographs	2
Waste-bin	4
Entry/Exit	4
Toilet	2

4.4 :Global Primary Process at INDAL-Hirakud



4.5 : Employee Levels At INDAL-Hirakud



4.6 : Accident Record at INDAL

Year	1988	1989	90-91	91-92	92-93	93-94	94-95	95-96
INDAL	55	48	46	27	36	19	18	17
Hirakud	1	2	1	2	1	0	0	3

4.7 : Statistics of Meetings

Meeting	Frequency	Man Hours
HOD	Fortnightly	8
WSC	Monthly	7
MRC	Quarterly	4
Union-Management	Monthly	4
Departmental	Monthly	3
Management EOHS	Monthly	2
Environment	Monthly	2
Cost	Monthly	3
DSC	Fortnightly	2
ST Communication	Fortnightly	7
Central Passage	Daily	2
EPM	Fortnightly	2
BGC Project	Fortnightly	2
CAPEX	Monthly	2
Farewell	Monthly	0.5
SH Council	Monthly	1
Kaizen Appreciation	Fortnightly	1

4.8 : Goal Approach Matrix

Approach →		IPO 1	IPO 2	IPO 3	IPO 4	IPO 5	IPO 6
Goals ↓	Unit ↓						
G1		*		*			*
G2			*			*	
G3		*			*		
G4				*			*

G1, G2, etc. represent different goals and IPO 1, IPO 2, etc. represent different processes that are to be improved.

4.9 : Company goals for the Year 2001

- 1) Less than or Equal to 25% ROCE.
- 2) Revenues to grow 15% PAT (195 Rs), Export 25% of revenues (14%).
- 3) Reduce exposures: metal, Alumina, Forex.
- 4) Number 1 preferred suppliers in chosen markets, businesses and with chosen customers.
- 5) Amongst top 10 on OH & S, ethics.
- 6) Employees involvement : Top 20 in India, No 1 in the industry.
- 7) Link remuneration at least 20% to business profitability (80 % of future non UDA increase)
- 8) Restructure * Organisation * Planning * Review & * Information system to serve business and company goals and to improve/increase synergy gains.
- 9) Consistently commit resources to community development to be cherished where we operate.
- 10) Ensure technology upgradation to support business and company goals

4.10 : Chart For BGC Activity Status

Problem :									
Location:									
Duration :									
Team Members	Sponsors:							Team Information :	
	Leaders:							Objective etc. :	
	Members:							Project Starting :	
Meet - ings	No	Date	Time	Attendance			Project Ending :		
							Comments (How each step was done)		
Outline Of activities	1	2	3	4	5	6	7		

4.11 : Form for Filling Kaizens

Name:		Number:		Department:	
TQM : Kaizen For Progress					
Situation Before Kaizen:			Situation After Kaizen:		
Action:			Benefits:		
Improve on:	Safety	Waste	Ease of Work	Others	
	Quality	Environment	Customer Satisfaction		

4.12 : Annual Plan for 1996-97

TARGETS	QUANTIFICATION
Metal production	29,000 tons
Sales Paste	6600 tons
DC Energy	14.95 Kwh / KGs of Al.
Current Efficiency	88.5 %
Line Current	54.5%
Volts per Pot	4.43 Volts
Training	4 Man Days/Employee

4.13 : Training Status

Per Capita man days			Training Status	
Month (1996)	Target	Actual	External	Internal
April	0.37	0.5	18	135.5
May	0.375	0.26	84	25
June	0.37	0.4	5	103.5
July	0.37	1.11	49	335
August	0.375	0.21	14	0
September	0.375	0.31		
October	0.375	0.31		

4.14 : Quality Policy Deployment

Specific	Approach	Sub Approach
Complete Customer Satisfaction	Customer Orientation	Timely analysis of metal & carbon
Complete Customer Satisfaction	- do-	Accuracy of analysis Rendering technical assistance to customers
Internationally competitive	Bench Marking	Timely Analysis. Rendering Technical analysis. monitor efficiency regularly.
Vendors based on quality	ISO 9000	Analysis of raw materials, interaction with suppliers. educating suppliers through visits.
Satisfy internal customers	TQM communication	Meeting 100% requirements of different departments. Inviting customer to departmental meetings. and assisting other departments for better working environment.

4.15 : TQM Notice Board

GOALS FOR 1996-97	QUANTIFICATION
Profit	21.16 Crore
3 rd party Sales	7.30 Crore
Preferred Suppliers	06 Nos. [Belur 01, Carbon 05]
Safety	Accident Frequency < 01 Severity < 30
Employee Involvement	50% Kaizen Participation
Community Development	7.00 Lakhs
Technology Upgradation (Castor Project)	30 Crores

4.16 : Performance Indices for the Year 1995-96

Indices	Budgeted	Actual
Hot Metal	2290 ton	2244 ton
DC Energy	14.95 Kwh/kg Al	15.42
Total AC	16.60 Kwh/kg Al	16.90
Current Efficiency	85.0	88.0
Purity	99.69	99.77
Paste Factor	.504	.494
RI	2200	1792
Fuel Oil for Casting	11.5 Lt/Ton	11.45
Total Paste Prod.	1.196 Ton	nil
Fuel Oil for Carbon Products	26.0 Lts / Ton	nil
Melt Loss	.404	.272

4.17 : Production Profile

	1994 (Avg)	1995 (Avg)	April	June	Aug.	Sept.	Oct.	Nov.
Metal Prodn. (Tons/month)	1760	2017	2025	2244	2367	2249	-	-
Metal Purity (%)	99.73	99.81	99.79	99.7	99.72	99.79	99.78	99.78
AC (Kwh/Kg of Al)	15.81	15.61	15.54	15.98	15.3	15.71	15.4	15.58
AC (Total) (Kwh/Kg of Al)	16.85	16.79	16.4	16.9	16.5	16.67	16.52	16.57
Cryolite Use (Kgs/Kg of Al)	.021	.02	.016	.010	.018	.018	.018	.017
AlF ₃ Use (Kgs/Kg of Al)	.03	.03	.02	.031	.033	.032	.027	.026
Paste Use (Kgs/Kg of Al)	.511	.503	.495	.494	.490	.49	.43	.498

5

CASE ANALYSIS

This chapter covers the analysis of the case. Seven areas were identified from the literature (Chapter 2) to understand the process of TQM implementation. These seven areas are :

- Organization Structure.
- Commitment of top management.
- Performance appraisal, reward, and recognition system.
- Group activities.
- Inter-departmental relationship.
- Supplier relationship.
- Customer relationship.

The case has been analyzed on these issues. INDAL-Hirakud is a very old organization (Section 4.1), but its TQM programme began only in 1993 (Section 4.6). Therefore, the analysis intends to study the changes in the above mentioned areas after the start of TQM programme (after 1993). The practices adapted by the organization in these areas are therefore compared before and after TQM implementation. It has also been attempted to analyze the perceptions of different constituents in the organizations. For the external customer-supplier relationship and inter-departmental relationship issues, the constituent analysis has not been done and only the views of the middle management have been taken. For the analysis purpose, the organization has been divided into three constituencies (See Figure 4.6 for organization structure). The union officials have been considered a part of the lower staff for the analysis purpose. However, where there are significant differences in the perceptions it has been mentioned specifically. The different constituencies are :

1. Top Management (Works Manager and functional heads).
2. Middle Management (Superintendents, Asst. Superintendents, and Foremen).
3. Lower Staff (Supervisors, operatives and union officials).

Therefore the case has been analyzed on the following lines :

- Changes that have taken place in the above areas.
- Reasons for the changes.
- Outcomes/effects of the changes.
- View points of different constituents and the reasons for the differences in perception.

5.1 Organization Structure

Table 5.1A : Changes in Organization Structure

<i>Situation before TQM</i>	<i>Situation After TQM</i>
<ul style="list-style-type: none"> • No documentation of responsibility and authority. • Training, its need identification was the responsibility of the personnel department. • Safety was under the personnel department. 	<ul style="list-style-type: none"> • No changes in the hierarchy and removal / elimination of certain posts. • The responsibility for TQM related activities delegated to the concerned departments. • Responsibility and authority clearly defined after documentation. • Training delegated to concerned departments. • The safety in-charge, though under Personnel head, was made to report directly to the Works manager to reduce delay.

Table 5.1B : Perceptions Regarding Organization Structure

Top Management	Middle Management	Lower Staff
<ul style="list-style-type: none"> • Responsibilities were already clearly defined. • The CEO of the company feels that by making Quality 	<ul style="list-style-type: none"> • Responsibilities have been clearly defined due to documentation but are increased due to Kaizens, House keeping and other TQM activities. 	<ul style="list-style-type: none"> • After documentation, the responsibilities are clearly defined. • Work load is reduced due to documentation as previously there used to

<p>an enterprise wide goal, hierarchies can be crushed easily.</p> <ul style="list-style-type: none"> • Empowerment, and delegation of authority was already there at all levels before TQM. • Almost all the employees perceive that communication has increased after TQM implementation and one can go to any one to ask anything. 	<ul style="list-style-type: none"> • The delegation of authority is mainly at the top management level and is generally not done at the bottom level. • Empowering employees is mainly done by participative decision making through meetings and delegating authority. • Documentation has resulted in decreasing empowerment. 	<p>be conflicts regarding responsibilities.</p> <ul style="list-style-type: none"> • The workers also feel that TQM activities are extra to their normal work and they find little time for these activities due to the excess work load. • The kind of work is different and so they are not able to take the decisions and so there is less scope for empowerment.
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5.1.1 Analysis

- It is evident that except for some small changes, there were no major changes in the organization structure, hierarchy, and decentralization after TQM implementation. These small changes can be indirectly attributed partly to TQM and partly to ISO certification. The plant did not establish a separate quality department for TQM as this could be upsetting when TQM is "added on" to a process, system or organization, and is often perceived as unnecessary and foreign. Instead the responsibilities for different TQM activities and training for TQM were delegated to various departments. But this step had negative impact on the middle

management and the lower staff (Table 5.1.2). The reason for this behavior is that they have to defend their departmental targets in the monthly WSC meetings.

- The perception of the lower staff that the work load has decreased after documentation can be due to the fact that earlier the employees had to perform those jobs also, which were actually not their jobs. After documentation, they know clearly about their roles and responsibilities and perform only those jobs that have been documented (Section 4.7.3).
- Another factor in this respect is that the other plants of INDAL are also following more or less the same structure. So the managers might have a feeling that present structure is sufficient (other plants of INDAL have been following TQM earlier than Hirakud plant) for TQM implementation and is a company wide policy, although there was no evidence for this perception.
- It can also be argued that, at the implementation stage, the drastic change of the structure is a difficult task as the employees will not be able to respond immediately to the changed structure. The drastic change of structure can cause employees to resist in adapting the new structure. Moreover, redefining roles and job responsibilities can provoke fear in them.
- The statement of the CEO that hierarchies could be crushed easily by making TQM an enterprise-wide goal. But this is difficult to achieve, as this can only be successful when both the management and the employees are fully committed towards TQM activities, which is not actually happening at INDAL. Moreover, this is not a one day process and needs a total cultural change.
- The discrepancy of conflicting views between and the employees can be attributed to the poor communication and interaction between the management and the lower staff before TQM implementation. Due to poor communication, the management was unable to know whether the roles and the responsibilities of the lower staff were clearly defined or not.

The reasons that employees do not feel that they can be empowered are :

- The nature of job is “different”(routine) and so they can not be empowered (Section 4.7.4). This can be mainly because they are not properly trained so that enough confidence is generated in them. However, training can be the tool to generate confidence among the employees so that they can be empowered.

- Documentation has increased formalisation and this has reduced employee's autonomy for taking decisions as the rules and regulations are increased.

5.2 Commitment of Top Management

Table 5.2A : Changes in Commitment of Top Management

<i>Situation Before TOM</i>	<i>Situation After TOM</i>
<ul style="list-style-type: none"> • No example setting by the management.. • Less interaction between management and employees. • No visible support to group activities and less involvement of management in them. • No joint consultation with the workers except in union related matters as per agreement. • Communication was not open and information sharing was less. • No active participation of management in training activities, presentations etc. 	<ul style="list-style-type: none"> • Setting Personal Examples in the areas of Kaizen, House keeping etc. • Removing the Barriers of interaction between management and the workers as canteen walls etc. • Support to Group activities. • Joint Consultation and sharing knowledge with union and workers, that resulted in increased communication and openness between employees and management. • Developing an Egalitarian climate through Shared Vision/Information, Open communication, Training and coaching the employees, Employee involvement, Business ethics, community citizenship, and Environment friendly system and community services. • Leveraging transparency to build trust (Example: giving unstated compensation to workers and pay reduction by management during economic crisis) (Section 4.8.2). • Active participation of management in training activities, presentations etc.

Table 5.2B: Perceptions Regarding Commitment of Top Management

Top Management	Middle Management	Lower Staff
<ul style="list-style-type: none"> • Full commitment from the management is lacking as some managers do not want 	<ul style="list-style-type: none"> • Full management commitment is lacking because of resistance to mix with workers and 	<ul style="list-style-type: none"> • Many managers are not committed towards TQM activities and TQM is only a rhetoric.

<p>to share information and mix with the workers.</p> <ul style="list-style-type: none"> • TQM is seen as a top driven approach by the lower staff. • The employees have shown that they can achieve the targets but sustaining them is a problem. 	<p>high work load.</p> <ul style="list-style-type: none"> • TQM is seen as a top driven approach by the lower staff. 	<ul style="list-style-type: none"> • TQM activities are seen as something extra to the normal job. • Distrust in both management and the union leaders in TQM activities (Section 4.9.4). • External Training is first attended by the management and later they train the employees. This has helped the employees to understand the concepts better and has helped to bring management and the employees closer.
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5.2.1 Analysis

Inspite of the different steps taken by the management to show commitment, the management is unable to communicate visible commitment towards TQM activities to the lower staff. The reasons for this shortcoming are :

- The workers perceive these activities extra to their normal work load. They feel that Kaizen activities, training activities are imposed on them by the management (Section 4.7.3). This is also due to the fact that the union sometimes asks the employees to stop Kaizen participation and attend training activities. This behavior of union may have caused a feeling among the employees that these activities are not in the benefit of the workers.

- Full management commitment is lacking as many managers do not want to share information and mix with the workers (Section 4.8.1). Some departments and managers pay lip service to TQM activities rather than actually participating in it. The example setting is done by only few managers. Also some of the union officials do not want that the managers should interfere in their matters.
- Distrust of workers towards union officials and management has caused them feel that they are trapped between the management and the union (Section 4.9.4).
- TQM is perceived as a top driven approach rather than a bottom up approach (Section 4.8.1). For example, unionized employees are paid extra money for attending training sessions if they come in shifts other than their normal working hours. This might cause the employees to perceive that the management has personal interests in training the employees as they are giving payments for it.
- Though the barriers of interaction between the management and employees are removed, the management is unable to communicate the desired message as these efforts are not implemented successfully as managers sit in their circles in the mess and/or do not eat in the mess etc.
- Joint consultation with union, supervisors, and workers are mainly done through WSC, DSC meetings, and discussions. However, these meetings are only advisory in nature and do not have any executive power.

5.2.2 Effect of Measuring TQM Progress

INDAL devised many parameters for measuring the progress of TQM. But this had a negative impact to some extent on the employees. Although there was no direct evidence of fear of measurement on employees but there are certain indirect evidence as molding of data/facts, blaming each other (departments) in WSC meetings. The employees are fearful of measurements because they believe that their performance is being measured. This feeling has caused the employees to perceive that TQM at Hirakud is a top driven approach and this feeling can be detrimental for any organization adapting TQM. Therefore the employees never participate on their own. When employees do not participate on their own, the middle management has an increased responsibility to meet the targets set by the management which are reviewed in WSC meetings. This is also the reason why in the Quality month, the participation of

the employees in the TQM activities is increased drastically as compared to other months, as in the Quality month, persons from the corporate head office visit and review the TQM progress. Though the initial commitment is generated among employees which is evident from the fact that employees are able to meet the targets, but sustaining the performance is a problem.

5.2.3 Role of Management-Union Relationship

The workers do not trust both the union leaders and the management. This has caused workers to feel that they are helpless and perceive that both are trying to squeeze the workers for their benefits. The behavior of union towards the TQM activities is also very critical in this respect. Before and during the elections they make TQM activities as a tool to win the elections but after the elections they make TQM activities as a tool to meet their demands (Section 4.9.4). This has left workers in a confused state. Moreover, the workers perceive that the management favors the union leaders and individuals close to them in promotions, etc.

5.3 Performance Appraisal, Reward and Recognition System

Table 5.3A : Changes in Performance Appraisal, Rewards, and Recognition

<i>Situation Before TQM</i>	<i>Situation After TQM</i>
<p><i>Performance Appraisal Policy</i></p> <ul style="list-style-type: none"> • Appraisal policy for the management and the lower staff was the same and it was not open, though at the management level the appraisee could ask his senior about his appraisal. • Frequency of appraisal was once in an year. • The procedure for appraisal was not formal. • There were no performance indicators in performance appraisal and it was of general nature. • The promotion policy was performance based and there were no time bound promotions. 	<ul style="list-style-type: none"> • The appraisal policy for the management staff was changed and made open and done in presence of a third person . • No changes in Performance appraisal policy for the lower staff and it is closed. • Frequency of appraisal increased to twice per year. • The procedure for appraisal was formalized. • Addition of performance indicators in appraisal. • Training was related to performance appraisal. • No changes in promotion policy.

<p><i>Rewards</i></p> <ul style="list-style-type: none"> • The only rewards that existed were production related that were set in agreement with the union. • Monetary rewards for best suggestions in the suggestion scheme. There were no rewards for other activities. <p><i>Recognition</i></p> <ul style="list-style-type: none"> • No employee recognition given by the management. 	<ul style="list-style-type: none"> • No changes in production related rewards. • After elimination of suggestion scheme, the monetary reward associated with them was also removed. • New rewards mostly non monetary were introduced for promoting TQM related activities. • Public Recognition (mostly personal and non monetary in the form of dinners, tea etc.) by the top Management was introduced. • Publicizing Model behavior and role models of the employees inside the works.
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Table 5.3B : Perceptions Regarding Performance Appraisal, Rewards, and Recognition

Top Management	Middle Management	Lower Staff
<ul style="list-style-type: none"> • The reason for different policies for the management and the lower staff is that the policy is first tested at the top level and will be introduced to the lower staff at a later stage. • The management is open in appraisal and lower staff can ask for their shortcomings. 	<ul style="list-style-type: none"> • Same views as the top management for different policies. • New appraisal policy needs more time and formal environment as it is done in the presence of three persons and all the three must be present at the same time and place. • The appraisal policy in presence of a third person is not always followed. 	<ul style="list-style-type: none"> • Different policies for both the workers and the management staff has made the workers perceive that the management is trying to make differences. • The close appraisal policy for the lower staff has resulted in distrust towards management. • Different policy is seen as a practice that causes separation between the

<p>Public recognition in the form of dinners, tea etc. has helped in satisfying the secondary needs of employees as belonging and self-esteem.</p>	<ul style="list-style-type: none"> • Management is open in giving feedback to lower staff. 	<p>management and union.</p> <ul style="list-style-type: none"> • Management gives feedback only when asked but one can not question that. • The workers are fully aware of the link between the rewards and their performance and are satisfied with the reward system mainly because they are set by the union and campaigning for it is done during elections. • Public recognition makes them feel proud and happy.
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5.3.1 Analysis

5.3.1.1 Performance Appraisal

- Since the appraisal is closed and promotion is based on the performance and solely given by the management, therefore the employees want that they should clearly know what are their short-comings. This policy would have been fit if the promotion policy were time based.
- The promotions are done by inviting the employees and interviewing them for the vacant posts (Section 4.5.3). Thus the promotion policy is evaluating one employee over the other. Moreover such a promotion policy, that is based on the performance appraisal can be detrimental to team work as it can foster rivalry and politics among the employees because promoting one individual over the other is

an evaluation and a sort of ranking the employees among themselves and this can result in rivalry among the employees instead of fostering team work.

- There was no evidence of customer involvement in performance appraisal of employees at any level. This is contrary to the TQM philosophy as the literature says that the customers (both internal and external) should be involved in the performance appraisal.
- Performance appraisal and training are both related to each other. The weak areas of employee, identified in the performance appraisal are generally referred for training. On the other hand, the training status of each employee and the areas of training attended by him (Section 4.10.5) are considered in performance appraisal. This is a positive factor of performance appraisal.

5.3.1.2 Rewards

- The production related rewards are given in groups at the plant level (Section 4.5.2). Other rewards such as "Safety award" (Section 4.5.5), HK trophy (Section 4.6.8) etc. are also given departmentwise. Therefore it can be said that the rewards are mostly given in groups and are not individual.
- Most of the rewards are generally planned and are given soon after they are earned. This is evident from the fact that the procedure, time and norms of different rewards as Kaizen appreciation (Section 4.6.7.1), Safety award, HK trophy etc. are established.
- There was no evidence of customer involvement in rewards. This is contrary to the TQM philosophy as TQM demands that the customers should be involved in the reward process of the organization.
- The production related rewards are not given if the targets are not met during a particular month. Also there are contests for safety award (Section 4.5.5), Kaizen lottery (Section 4.6.7.1) etc., and there are specific norms to participate in these contests. For example, to participate in the safety contest the plant should have total accident free record during the quarter considered (Section 4.5.5). Rewards are given only for end results and not for processes necessary to achieve them.
- The rewards that have been added after TQM implementation were mostly of non-monetary nature as House keeping trophy, Safety Horse award, except for the

lottery system for Kaizen. The inter-departmental contests for these rewards have generated rivalry between the departments. It is evident that the monetary rewards are mainly given for production related matters while non monetary rewards are given for other activities. This may cause a feeling among the employees that the two activities, viz. production and TQM activities have different priorities for the management. This issue raises a critical problem that as the production related monetary awards were already existing before TQM implementation and most of the non monetary awards were added after TQM implementation (as argued by Quality gurus that the monetary awards in TQM activities should generally be avoided, as this can be perceived as a part of their compensation). The problem arises that what should be done when a company is already having several monetary awards which often indicate, management's priorities and when non monetary awards are introduced at a later stage, they are given lesser importance by the employees and can not fully indicate management's priorities for those issues.

- As all the rewards are given on departmental basis, this has communicated a message of team effort with in the department. But this has also created an ambiance of rivalry between the departments as only one department wins the awards (Also see Section 5.7.1)

5.3.1.3 Recognition

- As evident from the case, mostly public recognition is given to employees by the management in the form of dinners, tea, addressing on public address system etc. Therefore the general nature of recognition is public. Such practice has helped in communicating management's commitment towards these activities. Also public recognition has helped in satisfying social needs of the employees and bringing them closer to the management.
- The recognition is mostly personal, open and non monetary. The non monetary nature is evident as the employees are given dinners, tea etc. for their achievements. Publicizing the model behavior of the employees through public address system shows that the recognition is open.

5.4 Group Activities

Table 5.4A : Changes in Group Activities

<i>Situation Before TOM</i>	<i>Situation After TOM</i>
<ul style="list-style-type: none"> • Suggestion scheme with voluntary participation. • The employees were not asked to implement the suggestions they gave. • A number of non implementable suggestions. • Cash prizes were given for best suggestions. • There was no specific area of suggestions and they were from every field i.e. the suggestions had no orientation along the company goals. 	<ul style="list-style-type: none"> • Introduction of new models- SGA and later on BGC suggested by the external bodies. • In SGA the projects came from among the employees who were asked to implement them, but in BGC there was a set procedure to select particular project. • The existing activities were not formally removed but were informally eradicated. • Cash prizes were replaced by non monetary rewards in these models. • Procedure for making a team, training the team members, selecting the project was formalized. • Participation was not compulsory in these activities.

Table 5.4B : Perception Regarding Group Activities

Top Management	Middle Management	Lower Staff
<ul style="list-style-type: none"> • Full commitment is lacking in group activities from lower levels as it is seen as top driven. • The success of Quality circle activities is not 	<ul style="list-style-type: none"> • Commitment in lower staff is lacking as seen as a top driven approach and De-motivation among employees as the previous scheme had monetary benefits which was subsequently removed in the later scheme. • Progress of SGA 	<ul style="list-style-type: none"> • Less participation due to increased work load. • Top Management is not fully involved in Quality activities. • No clear delegation of responsibilities to the team members. • Progress of Group activities is slow. • No clear delegation of

<ul style="list-style-type: none"> • Participation in appraisal system. 		<ul style="list-style-type: none"> • No participation in formulation of the system.
<ul style="list-style-type: none"> • Customer involvement in appraisal • Training should be related to Appraisal. • Combination of both monetary & non monetary rewards. • Employees should not be evaluated with each other. • Rewards should be both planned and unplanned. • Rewards should be given for efforts and not for end results. • Recognition should be public. • Model behavior should be publicized. • Participation in formulation of reward system 	<ul style="list-style-type: none"> • Training & Appraisal are linked to each other. • Both types of rewards are given. • Only planned awards are given. • Public recognition in the form of dinners, tea etc. • Model behavior is well publicized. • Participation in deciding production incentive through union. 	<ul style="list-style-type: none"> • Customers are not involved. • Monetary awards only in production areas. • Employees are evaluated against each other in promotions • There are no unplanned awards. • Only end results are focused. • No feedback from employees and so no realization of any participation by lower level employee

4. Group activity

<ul style="list-style-type: none"> • Use of groups for quality improvement efforts • Identification of projects by the teams. • Company goals should be linked with the projects. • Voluntary participation • Training about project orientation. • Time Scheduling of Projects. • New projects should start only when existing ones are completed. • Commitment of all levels towards group activities. • Equal responsibility to all team members. 	<ul style="list-style-type: none"> • SGA activities, BGC projects. • Adapted only in first model. • Only in the second model. • Participation is voluntary. • Training is provided in general areas. • Projects are scheduled before they are started. 	<ul style="list-style-type: none"> • Frequent change of models. • In second model, area identified by a specific procedure. • Specific training is not provided. • The schedule is not followed strictly. • Projects are started without the completion of existing ones. • Middle management burdened with many projects. • Responsibility is not equally distributed.
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- The models of the group activities were changed frequently - first the suggestion scheme was informally closed, then adapted SGA model and later on BGC model. Frequent changes in the models has generated a sense of insecurity among the employees as it is considered a management fad (Section 4.6.6.9).
- Interest among the members is lacking as the projects are being decided by a structured approach through Goal-approach matrix (Section 4.6.6.4). Therefore self interest is lacking as the employees do not fix the problems on their own. It is widely proposed in the literature that the projects should come from the employees itself so that they have vested interests in implementing them. But in that case employees usually try to join or start a project that will tackle their own problems. If everyone is empowered to start a team to tackle a personal issue, organizations will be faced with troubleshooting, symptom solving and chaos. Therefore the projects should definitively be linked to the company goals, but proper care should be taken to generate interest among the employees.
- New projects are started in each quarter without the completion of ongoing projects. When new projects are started and as the leaders and sponsors of the projects are generally of the level of superintendent and assistant superintendents (Section 4.6.6.6), they are burdened with more than one project at one time. Therefore the leaders and sponsors are not able to give proper time to the new and ongoing projects. This may be a reason that the projects are not completed in time.
- Specific training related to the projects is not given. The distribution of responsibilities among the team members is uneven. Employees perceive that the work load is high and they have less time for these activities (Section 4.7.3).

5.5 Supplier Relationship

Table 5.5 : Changes in Supplier Relationship

<i>Situation Before TQM</i>	<i>Situation After TQM</i>
<ul style="list-style-type: none">• No Vendor rating system.• No procedure for vendor selection procedure.• Infrequent meetings of vendors.• No test visits and checking of vendors.	<ul style="list-style-type: none">• Introduction of vendor rating system.• The procedure for vendor selection was formalized.• Meetings with the vendors once a year.• Making test visits and checking the facilities of vendors were introduced.• No changes in the sourcing policy.• Responsibility and authority for testing the incoming materials were defined.• Requirement of Test certificate in some critical items.

5.5.1 Analysis

- The reason for the not maintaining multiple sourcing is the remote location of the plant. The plant has gone for multiple sourcing to maintain continuous supply, and to maintain a good bargaining position regarding quality and cost.
- The mind set of the purchase department has not changed and they do not want to change the existing relationship with the vendors as they feel that their work load will increase. They just pay lip service and never take active part(Section 4.12.5).
- Some of these changes have been done as a requirement for ISO certification.
- Vendors for its major raw materials are big companies (Section 4.12). The items sourced are their secondary product. It can be possible that these companies might not concentrate on their secondary products, and maintain close relationship with customers for their secondary products, although there was no evidence for it as the study did not analyze the supplier side due to time limitations.
- The multiple sourcing of the items has resulted in increasing difficulty in maintaining close relationship with the vendors due to location of vendors at different places and the number of vendors.
- TQM literature on supplier relationship says that partnership relationship as collaboration, equity participation etc. help in maintaining a better relationship between the supplier and the customers. But there is no partnering of any sort with

the suppliers in the present case. The reason may be that such a relationship is difficult to maintain when most of the items are multiple sourced.

- Price has no weightage in vendor assessment (done after every purchase- Section 4.12.5) and the only index that are considered are of quality and delivery. However, while selecting a supplier before a purchase, price factor is considered (Section 4.12.5). There is a discrepancy in this procedure.
- Earlier the plant was not having captive power. And therefore uncertainty in power availability resulted in uncertainty to meet the demands. This possibly gave rise to uncertainty in requirement of raw materials. And therefore the plant had ease in receiving the raw materials in short delivery time by adapting multiple sourcing, as if one supplier is unable to meet the requirement then they may go to other.
- Making surprise test visits of the vendors to test them means that one does not have trust over the other and this is contrary to TQM philosophy. But this practice (adapted after TQM implementation) is done because some of the vendors in the past were fake and had no manufacturing facilities (Section 4.12.1).

5.6 Customer Relationship

Table 5.6 : Changes in Customer Relationship

<i>Situation Before TQM</i>	<i>Situation After TQM</i>
<ul style="list-style-type: none"> • No clear definition of responsibility and authority for reviewing and monitoring the quality of products. • There were no regular customer-supplier meets. • No regular discussions at the departmental / plant level to discuss quality related problems. 	<ul style="list-style-type: none"> • The responsibility and authority for monitoring and reviewing quality of products and incoming materials were clearly defined. • Regular and timely analysis of metal and carbon products was made mandatory. • Quality problems discussed through DSC and WSC meetings. • To satisfy the customer needs better and reducing the defects, the projects were chosen through a standard procedure (goal-approach matrix). • Response time to customer complaints was reduced from 1 month to around 15 days. • Regular customer-supplier meets arranged once a year.

5.6.1 Analysis

The reasons for starting these activities are

- The responsibilities and authorities were documented because it was a requirement under ISO.
- The plant was facing a stiff competition from its competitors in the early '90s. The technology being very old as compared to its competitors, so the defects were higher vis-à-vis its competitors. As the final product was being shipped to its sister plant(at Belur), there were no major problems as the requirement of Belur was quite high. But there were complaints/rejections due to the defects. Since the change in technology was not feasible, the importance was given to timely analysis of incoming and outgoing products, responding to complaints immediately, and customer-supplier meets.
- Departmental steering committees have helped in responding to customer complaints. Earlier there were no such meetings, but now due to such meetings and clearly defined responsibilities the response time has been reduced (Section 4.13).

5.7 Interdepartmental Relationships

Table 5.7.1 : Changes in Interdepartmental Relationships

Situation Before TQM	Situation After TQM
<ul style="list-style-type: none">• No regular departmental interaction to resolve production related problems.• No inter-departmental contests in areas of safety, house keeping Kaizens etc.• No concept of internal customers and suppliers.	<ul style="list-style-type: none">• Departmental steering committees were formed to discuss production, quality, delivery related problems and to monitor TQM progress.• Works steering committee was formed to discuss the above problems once in a month.• Introduction of inter-departmental contests for TQM related activities and safety etc.• Training to employees in the concept of internal customers and suppliers.• Introduction of quality indicators and mission statements for different departments.

5.7.1 Analysis

- The quality related problems are generally discussed between the concerned departments and the quality department which generally acts as solution provider to solve the problems. The main problem is with the delivery of materials in between the departments, which generally remains either un-discussed or discussed with no results in DSC meetings, as there is no formal procedure for the delivery of materials between the departments. The undiscussed issues are generally raised in the monthly WSC meetings. Since such meetings are done in front of the Works manager, there are heated discussions and blaming to cut corners.
- The inter-departmental contests as House Keeping, Safety award etc. are done at the departmental level. This is on one hand advantageous in measuring TQM progress and creating competition among the departments. On the other hand, it has generated rivalry between the departments because the departments have to defend their achievements in the monthly WSC meetings in front of WSC members and the Works manager. Thus there is a fear of measurement among the employees. This is also evident from the fact that they mold the data/facts of the achievements in WSC meetings.

CONCLUSION

6.1 Introduction

The present chapter deals with the research findings and learning from the study. It also covers limitations of the present study and suggestions for further study.

6.2 Research Objective :

The objective of the research was “to study the organizational changes necessary for TQM implementation”. The areas studied in this research were :

- Organization Structure,
- Commitment of Top Management,
- Performance Appraisal, Reward, and Recognition System,
- Group Activity,
- Inter-departmental Relationship,
- Supplier Relationship, and
- Relationships with Customers

The aim of the study was to track the changes in the above areas, the nature of these changes and the ground practices to make these changes happen.

6.3 Findings of the Study

Chapter 4 describes the case of INDAL-Hirakud regarding TQM implementation process. It covered the different areas mentioned in the research framework. The changes in these areas, since the starting of TQM implementation have been studied.

The analysis of the case is done in the fifth chapter. It gives a detailed insight about TQM practices being adapted by the organization. The seven change areas have been searched upon and a detailed report, specific to each one of those areas has been presented. This section aims at presenting the findings of the study based on the

analysis of the case and the achievements and shortcomings of the organization in these areas. The findings have been presented with respect to each area specifically.

Table 6.3 : Achievements and Shortcomings of the Organization on TQM Front

TQM Ideals	Achievement of the Organization	Shortcomings in Organization's Approach
<i>1. Organization Structure</i>		
<ul style="list-style-type: none"> • Delegation of Authority to lower levels. • Well defined job Responsibilities. • Empowering employees in their work.. 	<ul style="list-style-type: none"> • Delegation of authority in training and safety. • Documentation of responsibility due to ISO certification. • Participative decision making, meetings etc. and training adapted to empower employees. 	<ul style="list-style-type: none"> • Delegation in other areas is done only at the top level. • Perception of increased responsibility among middle management. • Meetings are advisory in nature, and employees feel that they can not be empowered.
<i>2. Commitment of Top Management</i>		
<ul style="list-style-type: none"> • Management by examples and walking around. 	<ul style="list-style-type: none"> • Visible involvement in quality movement. 	<ul style="list-style-type: none"> • Some managers are not committed.
<ul style="list-style-type: none"> • Provide direction & goal to the company. 	<ul style="list-style-type: none"> • Vision & Mission statement formulation by top management. 	<ul style="list-style-type: none"> • Not being utilized by lower level employees in their working.
<ul style="list-style-type: none"> • Formulate Quality Policy. 	<ul style="list-style-type: none"> • Formulated in 1993. 	
<ul style="list-style-type: none"> • Provide training regarding TQM and problem-solving tools. 	<ul style="list-style-type: none"> • Training procedure being formalized and authority delegated to various departments. 	<ul style="list-style-type: none"> • Delegation of authority in this area is perceived as an added responsibility.
<ul style="list-style-type: none"> • Participation in training programmes. 	<ul style="list-style-type: none"> • Outside training to management and union officials who then give internal training. 	<ul style="list-style-type: none"> • Union asks employees to stop training for their demands. Seen as a top driven approach.
<ul style="list-style-type: none"> • Communication with employees & teams. 	<ul style="list-style-type: none"> • Through meetings, and information sharing. 	<ul style="list-style-type: none"> • Some managers and union officials don't want to share information.
<i>3. Performance Appraisal, Reward System, and Recognition.</i>		
<ul style="list-style-type: none"> • Open Appraisal policy. • Employees should be Aware of the link between performance & rewards. 	<ul style="list-style-type: none"> • Only at management level. 	<ul style="list-style-type: none"> • Close policy for lower staff. • Full awareness of only monetary awards.

<ul style="list-style-type: none"> • Participation in appraisal system. 		<ul style="list-style-type: none"> • No participation in formulation of the system.
<ul style="list-style-type: none"> • Customer involvement in appraisal • Training should be related to Appraisal. • Combination of both monetary & non monetary rewards. • Employees should not be evaluated with each other. • Rewards should be both planned and unplanned. • Rewards should be given for efforts and not for end results. • Recognition should be public. • Model behavior should be publicized. • Participation in formulation of reward system 	<ul style="list-style-type: none"> • Training & Appraisal are linked to each other. • Both types of rewards are given. • Only planned awards are given. • Public recognition in the form of dinners, tea etc. • Model behavior is well publicized. • Participation in deciding production incentive through union. 	<ul style="list-style-type: none"> • Customers are not involved. • Monetary awards only in production areas. • Employees are evaluated against each other in promotions • There are no unplanned awards. • Only end results are focused. • No feedback from employees and so no realization of any participation by lower level employee

4. Group activity

<ul style="list-style-type: none"> • Use of groups for quality improvement efforts • Identification of projects by the teams. • Company goals should be linked with the projects. • Voluntary participation • Training about project orientation. • Time Scheduling of Projects. • New projects should start only when existing ones are completed. • Commitment of all levels towards group activities. • Equal responsibility to all team members. 	<ul style="list-style-type: none"> • SGA activities, BGC projects. • Adapted only in first model. • Only in the second model. • Participation is voluntary. • Training is provided in general areas. • Projects are scheduled before they are started. 	<ul style="list-style-type: none"> • Frequent change of models. • In second model, area identified by a specific procedure. • Specific training is not provided. • The schedule is not followed strictly. • Projects are started without the completion of existing ones. • Middle management burdened with many projects. • Responsibility is not equally distributed.
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• Resource allocation for projects.	• Resource allocated after discussions.	• Slow in allocating resource s of higher investment.
<i>5. Inter-departmental Relationship</i>		
• On the pattern of supplier-customer relation.	• Efforts in this direction through frequent meetings.	
<i>6. Relations with External Suppliers</i>		
<ul style="list-style-type: none"> • Single sourcing key items. • Joint ventures, collaboration, and long term relationship with suppliers. • Frequent meetings with suppliers. • Rating of vendors • Close relationship through vendor development. 	<ul style="list-style-type: none"> • Some of the vendors are with the organization since last 15-20 Yr. • Vendor rating system adapted. • Vendor development system adapted theoretically. 	<ul style="list-style-type: none"> • Multiple sourcing for most (95%) of the items. No such relationship with the suppliers. • Infrequent meetings with suppliers. • Practically no vendor development system.
<i>7. Customer Relationship</i>		
<ul style="list-style-type: none"> • Reduce response time to customer complaints. • Frequent customer supplier meets. 	<ul style="list-style-type: none"> • Response time to complaints reduced from 30 days to 15 days. • Such meets have started after 1993. 	<ul style="list-style-type: none"> • The frequency of such meetings is low.

6.4 Learning

The conclusion in Section 6.3, regarding the seven areas are specific to the case. In this section, learning from the study have been drawn. They have been reached after debating conclusions against research framework. These are as follows :

1. Organization Structure

- Delegating responsibility for participation in TQM activities to the middle management from the beginning of TQM programme and measuring its progress creates fear amongst the middle management that they are being evaluated .

- Empowerment and delegation of authority needs a change in the mind-set of the employees and they need to be more confident about their abilities. This can be achieved through training, and skill development, and participative decision-making.

2. Commitment of Top Management

- The barriers of interaction between the management and lower staff should be removed. But these actions should be continuously reviewed whether they are actually working or not.
- It should be conveyed to the employees that the reviewing of TQM progress is being done to improve the process, rather than individual performance, so that it should not create unnecessary fear among the employees.
- Weakening the employee union by the management results in distrust among the employees towards both the management and the union and therefore TQM activities can be seen with suspicion..
- Steps taken to remove the barriers between the management and the employees should be reviewed whether they are actually working or not.

3. Performance Appraisal and Reward System

- The organization should not heavily depend on performance for promotions of employees as it creates rivalry among the employees as they are being evaluated against each other.
- Different appraisal standards for management and the lower staff results in distrust towards management and this can be detrimental to TQM implementation.

4. Group Activity

- Starting new projects without the completion of existing ones results in the slow success of projects. Therefore the number of projects should be limited and new projects should be started only when existing ones are completed.
- Changing models of group activities frequently can be perceived as a management fad and may create demotivation among employees.

5. Inter-departmental Relationship

- Informal procedure of delivery and other activities between the departments leads to conflict between the departments.

- Reviewing of inter-departmental contests increases the team spirit at the department level but causes competition and rivalry between the departments, when their achievements are being compared.

6. Supplier Relationship

- Remote location of the plant act as a constraint in maintaining single sourcing, vendor development, and close relationship with them.

7. Customer Relationship

- Departmental and interdepartmental meetings help in monitoring and discussing quality related problems, and reducing response time to customer complaints.

6.5 Limitations of the Study

One limitation of the study is its generalizability due to only one case in a particular industry and location. Therefore, the analysis and findings are limited to the firm under research. Although we have attempted to provide the relevant quantitative data at most of the places, but certain relationships could not be well substantiated due to lack of quantitative data. The data has been collected by interviewing people, discussions with them, and reports of discussions etc. Their interpretations and biases affect the data provided by them. It has not been possible to interview every concerned person in the company. The study does not look into the functioning of the external customers and suppliers, and therefore the information presented by the organization in these areas could not be cross checked. Another shortcoming of the study is that it could not study all departments inside the organization.

6.6 Suggestions for further Research :

This study can be extended to data collection about external environment of the company including the suppliers and customers. Also generalizations can be facilitated by doing some more cases in same industry.

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